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ADVERTISING

For several years, the Executive Board of the A. V. M. A. has had a special committee studying the question of advertising. This is a knotty problem that has a habit of sticking its head up just about once in every so often. It is no secret that there is a very wide divergence of opinion among veterinarians as to what is and what is not ethical in the field of advertising. The question was referred to in a recent discussion as being "red hot," in fact so full of heat that it would burn the fingers of anyone who had the courage to touch it. The subject is one that is neglected, apparently, by some of our veterinary colleges, if we may judge from statements made and things done by recent graduates.

One phase of the subject that is overlooked all too frequently is the difference between advertising and publicity. The veterinary profession has needed publicity and it has been getting it in no small measure during recent years. Individual veterinarians have felt this urge for publicity and have taken steps to secure it, often by means of methods that have been open to question, as far as ethics are concerned. These efforts have resulted in nothing but "individual advertising" all too frequently.

As examples of well-planned publicity campaigns we recall the undertaking of the Nebraska State Veterinary Medical Association, several years ago, in the form of a series of veterinary articles that were published in the *Nebraska Farmer;* the disease-reporting service of the Eastern Iowa Veterinary Association, an activity that has been carried on uninterruptedly for more than a decade; the radio-broadcasting programs sponsored by the New York State Veterinary Medical Society for several years, and the more recent activities of the Massachusetts Veterinary Association in disseminating information on the subject of rabies.

By way of contrast, we recall a number of examples of advertising upon the part of individual veterinarians, directed to our official attention, usually with requests for disciplinary action against the alleged offenders. There was the case of the veterinarian who went "on the air" to broadcast the appointments of his hospital; the veterinarian who used a whole page in his local paper to tell the public that he was the only registered graduate in the city (when he wasn't); the veterinarian who used a whole page in his local telephone directory for making claims that were somewhat exaggerated, to say the least; the veterinarian who sent a postal card to every farmer for "miles around" to advertise his services in connection with vaccinating against hog cholera; the veterinarian who used the classified advertising columns of his local newspaper to solicit antirabies vaccination work at so many cents per dog; or the veterinarian whose posed photograph appeared in the newspapers along with a story about a cat suffering from diabetes (photograph showed veterinarian in white coat aiming hypodermic syringe at pussy).

The cases that give the most trouble are those in the twilight zone between publicity and advertising. To the credit of the veterinarians involved, in most cases it can be said truthfully that their intentions have been good. When told to cease and desist, they have willingly complied in the great majority of cases. There has been no desire upon their part to infringe upon the code of ethics. About the most severe criticism that could be made in some of these border-line cases has been "poor taste."

The committee referred to in the opening paragraph of this editorial recently made its first report. This is published on page 111 of this issue of the JOURNAL. Read it. Preserve it.

Liberty will not descend to a people; a people must raise themselves to liberty. It is a blessing to be earned before it can be enjoyed. —*Tilton.*

ANOTHER QUESTION

It is reported that, in answer to the question why an elixir of sulfanilamide was put on the market, the manufacturer has stated that this was done to meet a professional demand for a liquid form of the drug. When asked whether diethylene glycol had been used as a menstruum in any other preparation, the manufacturer replied that it had not been used in any preparation intended for internal use. These questions and many others were answered by the manufacturer in a circular letter dated November 22, 1937. The JOURNAL now has one question to ask: Why, instead of flooding the market with a new, untried preparation, did you not place small quantities, for trial use, in the hands of a carefully selected group of clinicians or some of the physicians who were asking for a liquid form of sulfanilamide? We doubt if one of our ethical veterinary supply-houses would even think of placing an untested pharmaceutical product on the market.

SECOND OUTBREAK OF TUBERCULOSIS AT BELTSVILLE

A second rather extensive outbreak of tuberculosis has been reported in the herd of cattle maintained at the U. S. Department of Agriculture Research Center, at Beltsville, Md. A tuberculin test applied to the herd of 336 animals, on December 17, disclosed 44 reactors. About two years previously, on January 16, 1936, to be exact, a test revealed 82 animals out of 378 to be infected.

Following the 1936 test, the reactors were slaughtered and subjected to unusually careful postmortem examination. Practically all of the lesions found were located in the cervical glands and thoracic cavity, suggesting that the infection had gained entrance through the mouth or nostrils. Veterinarians who investigated the 1936 outbreak, according to a statement released by the Department of Agriculture, under date of December 22, 1937, "agreed that the 82 reactors did not, in all probability, contract the disease 'naturally,' but they were unable to locate the source of the infection." The same release credited Dr. John R. Mohler, chief of the Bureau of Animal Industry, and O. E. Reed, chief of the Bureau of Dairy Industry, with a statement to the effect that the facts already in their possession strongly suggested "a malicious act."

The 44 animals which reacted at the recent test were located in six separate barns. For most of these animals the feed and water supplies are separate. Few animals are introduced to the herd from outside sources, and all additions to the herd are tested before admission. A rigorous investigation is under way to determine the cause of the outbreak. The results of this investigation will be awaited with more than ordinary interest.

If there has been any sabotage in connection with these outbreaks, we hope the culprits will be located and properly punished. Just why the particular distribution of the lesions in the reactors should suggest a malicious act is not clear, as in most cases of bovine tuberculosis the infection occurs through the medium of ingested food or inhaled air. Furthermore, the behavior of tubercle bacilli artificially introduced into the body is such as to render difficult any correlation between the location of the resulting lesions and the portal of entry.

EXECUTIVE BOARD ELECTION

The special election now in progress in Executive Board District 7 (Washington, Oregon, Idaho, Montana, Wyoming, North Dakota, South Dakota, Nebraska, Alaska, Hawaii and the Philippine Islands) will come to a close on January 17. The voting has been heavy. One reason for this may be found in the fact that very few of the approximately 500 members in District 7 were not qualified to vote. As a matter of fact, 464 ballots were mailed to as many members in the district, and a large majority of them have been voted. The result of the election will be announced in the February issue of the JOURNAL.

CHALLENGE

In a recent conversation with the sales manager of a company that advertises and sells both biological and pharmaceutical products direct to the laity, several rather interesting and possibly significant statements were made. We were debating the advisability of placing biological products in the hands of the poultryman. The discussion ended in a draw, as the sales manager contended that the policy was a safe and sound one, and we just as steadfastly maintained that it was not in the best interests of the poultry industry in particular and disease control in general. But here is a statement made by the sales manager,

Meet—

DR. C. F. SCHLOTTHAUER

Of the Mayo Foundation, Rochester, Minn., who discusses nervous diseases of lower animals in this issue of the JOURNAL.

DR. F. F. PARKER

Of Des Moines, Iowa, prominent practitioner and author of the paper on feline diseases in this issue of the JOURNAL.

DR. J. G. HARDENBERGH

Of Plainsboro, N. J., Chairman of the A. V. M. A. Special Committee on Food Hygiene for the current year.

DR. C. R. DONHAM

Of Ohio State University, Chairman of the A. V. M. A. Special Committee on Bang's Disease for the current year.

in defending his position, that rather got under our hide. He said that veterinarians never had shown any real interest in poultry practice, apparently do not care for such work and probably never will. He made the prediction that the control of poultry diseases in the future would be in the hands of a specially trained group of individuals, who, until otherwise classified, would be known as "poultry pathologists." Will the veterinary profession accept this as a challenge?

APPLICATIONS FOR MEMBERSHIP

The ten applications given first listing this month represent the final installment of the applications *filed* during the calendar year 1937. Last month we made a brief reference to the 451 applications *listed* during the year 1937, the largest for any calendar year since 1929. It is going to take some strenuous work this year to surpass the accomplishments of 1937, but it can be done if each member will put his shoulder to the wheel.

As has been the custom every six months, we quote Section 1 of Article 2 of the By-laws, covering the manner of filing an application for membership:

> Application for membership shall be made upon a blank furnished by the Association, in the handwriting of the applicant, and must be endorsed by two members of the Association in good standing, one of whom must be a resident of the state, province or territory in which the applicant resides. Application must be accompanied by the membership fee of $5.00 and dues pro rata for the balance of the fiscal year current, as stated on the application blank. Application must be filed with the Secretary and be examined by him for correctness and completeness as far as available information will allow. After such approval by the Secretary, the latter will cause to be published in the official JOURNAL, as soon thereafter as possible, said application with name and address of applicant, college and year of graduation, and names of vouchers. If no objections shall be filed with the Secretary, as against the applicant being admitted to membership in the Association, his name shall again be listed in the next issue of the JOURNAL, and if no objections shall have been filed within thirty days after the second publication of the name of the applicant, he shall automatically become a member and shall be so enrolled by the Secretary, and membership card issued. If any objections be filed against any applicant, either on first or second notice, said application will be referred to the Executive Board for consideration.

FIRST LISTING

BRUNER, DORSEY W. 371 Linden Walk, Lexington, Ky.
D. V. M., Cornell University, 1937
Vouchers: W. W. Dimock and F. E. Hull

BUTLER, LT. LUCIUS N., JR. CCC Army-1, Barksdale Field, La.
D. V. M., Kansas State College, 1937
Vouchers: Col. B. A. Seeley and J. L. Hopping.

ERRINGTON, BURNARD J. 311 S. Hanover, Lexington, Ky.
D. V. M., Cornell University, 1930
Vouchers: W. W. Dimock and F. E. Hull.

FECHNER, LT. WALTER W. Hdqrs. Dist. "E" CCC, Camp Beauregard, La.
D. V. M., Kansas State College, 1937
Vouchers: Col. B. A. Seeley and J. L. Hopping.

KRAL, JAMES 19½ E. Crescent St., Augusta, Me.
D. V. M., Kansas State College, 1935
Vouchers: Lt. Charles F. Prchal and Clarence C. Vierling.

LANDSBERG, MAX E. c/o Kingfisher Hotel, Kingfisher, Okla.
D. V. M., Iowa State College, 1936
Vouchers: S. A. Watters and Thos. O'Reilly.

RASMUSSEN, FREDERICK R. Glencoe, Minn.
B. V. Sc., Ontario Veterinary College, 1933
Vouchers: Joab P. Foster and John S. Dick, Jr.

TEICK, EARNEST R. Velva, N. Dak.
D. V. M., Chicago Veterinary College, 1914
Vouchers: Fred Low and Lee M. Roderick.

WAINWRIGHT, CHARLES R. Purcell, Okla.
D. V. M., Texas A. & M. College, 1937
Vouchers: Lewis H. Moe and C. H. McElroy

YOW, ARCH C. Henderson, N. C.
D. V. M., Kansas City Veterinary College, 1914
Vouchers: J. H. Brown and Wm. Moore.

Applications Pending

SECOND LISTING

(See December, 1937, JOURNAL)

Clair, Joseph E., Box 1086, Sacramento, Calif.
Dingwall, Stuart M., 214 N. 4th St., Grants Pass, Ore.
Doyle, Maj. Edward C., Cameron Highlands, Fed. Malay States.
Flack, Lt. George R., 2825 W. Somerset St., Philadelphia, Pa.
Gassner, Frank X., Colorado State College, Fort Collins, Colo.
George, Cedric K., Lester Prairie, Minn.
Hageman, Edward H., 421 E. McKinney St., Neosho, Mo.
Haynes, Charles F., c/o Lexington Apts., Helena, Mont.
Kinsley, Elmer F., 106 Grand Ave., Laramie, Wyo.
Phelps, Eldon T., Mapleton, Minn.
Rathore, Gopal S., 6, Haymarket, London S. W. 1, England.
Thomas, Arthur W., Chaska, Minn.
Twiehaus, Marvin J., 928 Thurston, Manhattan, Kan.
Winn, J. Douglas, West Suffield, Conn.
Woofter, H. Blaine, Troy, W. Va.

The amount which should accompany an application filed this month is $10.00, which covers membership fee and dues to January 1, 1939, including subscription to the JOURNAL.

One of the attractive things about the flowers is their beautiful reserve. —*H. D. Thoreau.*

COMING VETERINARY MEETINGS

California State Veterinary Medical Association and University of California Veterinary Conference. University Farm, Davis, Calif. January 3-7, 1938. Dr. Chas. J. Parshall, Secretary, Brentwood, Calif.

Pennsylvania, Conference of Veterinarians at University of. School of Veterinary Medicine, 39th St. and Woodland Ave., Philadelphia, Pa. January 4-5, 1938. Dr. G. A. Dick, Dean, 39th St. and Woodland Ave., Philadelphia, Pa.

Maine Veterinary Medical Association. Wooster House, Hallowell, Me. January 5, 1938. Dr. S. W. Stiles, Secretary, Falmouth Foreside, Me.

Cornell University, Annual Conference for Veterinarians at. New York State Veterinary College, Ithaca, N. Y. January 6-7, 1938. Dr. W. A. Hagen, Dean, New York State Veterinary College, Cornell University, Ithaca, N. Y.

Intermountain Livestock Sanitary Association. Ogden, Utah. January 6-8, 1938. Dr. D. E. Madsen, Secretary, Utah Experiment Station, Logan, Utah.

Vermont Veterinary Medical Association. Montpelier Tavern, Montpelier, Vt. January 8, 1938. Dr. G. N. Welch, Secretary, 43 Union St., Northfield, Vt.

Ak-Sar-Ben Veterinary Medical Association. Hotel Fontenelle, Omaha, Neb. January 10, 1938. Dr. J. D. Ray, Secretary, 1124 Harney St., Omaha, Neb.

Minnesota State Veterinary Medical Society. Nicollet Hotel, Minneapolis, Minn. January 10-11, 1938. Dr. C. P. Fitch, Secretary, University Farm, Saint Paul, Minn.

Oklahoma Veterinary Medical Association. Skirvin Hotel, Oklahoma City, Okla. January 10-11, 1938. Dr. F. Y. S. Moore, Secretary, McAlester, Okla.

Tennessee Veterinary Medical Association. Patton Hotel, Chattanooga, Tenn. January 10-11, 1938. Dr. A. C. Topmiller, Secretary, Department of Agriculture, Nashville, Tenn.

Rhode Island Veterinary Medical Association. Hotel Narragansett, Providence, R. I. January 11, 1938. Dr. J. S. Barber, Secretary, 14 Washington St., Central Falls, R. I.

Willamette Valley Veterinary Medical Association. McMinnville, Ore. January 12, 1938. Dr. Elwyn W. Coon, Secretary, Forest Grove, Ore.

New Jersey, Veterinary Medical Association of. Hotel Hildebrecht, Trenton, N. J. January 12-13, 1938. Dr. J. G. Hardenbergh, Secretary, c/o Walker-Gordon Laboratory Co., Plainsboro, N. J.

Wisconsin Veterinary Medical Association. Hotel Loraine, Madison, Wis. January 12-13, 1938. Dr. B. A. Beach, Secretary, University of Wisconsin, Madison, Wis.

Texas, State Veterinary Medical Association of. Houston, Texas. January 13-14, 1938. Dr. M. B. Starnes, Corresponding Secretary, Public Health Dept., Dallas, Texas.

Kansas City Veterinary Association. Auditorium, General Hospital No. 1 Annex, Kansas City, Mo. January 17, 1938. Dr. C. W. Schulz, Secretary, 800 Woodswether Rd., Kansas City, Mo.

San Diego County Veterinary Medical Association. Zoölogical Research Building, Balboa Park, San Diego, Calif. January 17, 1938. Dr. E. F. Sheffield, Secretary, 3895 Pacific Blvd., San Diego, Calif.

South Carolina Association of Veterinarians. Jefferson Hotel, Columbia, S. C. January 18, 1938. Dr. R. A. Mays, Secretary, 408-410 State Office Bldg., Columbia, S. C.

Iowa Veterinary Medical Association. Des Moines, Iowa. January 18-20, 1938. Dr. C. J. Scott, Secretary, Knoxville, Iowa.

Southern California Veterinary Medical Association. Chamber of Commerce Building, Los Angeles, Calif. January 19, 1938. Dr. B. B. Coale, Secretary, 203 Administration Bldg., Union Stock Yards, Los Angeles, Calif.

Kansas Veterinary Medical Association. Jayhawk Hotel, Topeka, Kan. January 19-20, 1938. Dr. Chas. W. Bower, Secretary, 1128 Kansas Ave., Topeka, Kan.

Colorado Veterinary Medical Associaton. Albany Hotel, Denver, Colo. January 20, 1938. Dr. Jay H. Bouton, Secretary, 9357 E. Colfax Ave., Aurora, Colo.

Ohio State Veterinary Medical Association. Neil House, Columbus, Ohio. January 20-21, 1938. Dr. R. E. Rebrassier, Secretary, Ohio State University, Columbus, Ohio.

Colorado State College Veterinary Short Course. Fort Collins, Colo. January 23-25, 1938. Dr. I. E. Newsom, Dean, Colorado State College, Fort Collins, Colo.

Mississippi State Veterinary Medical Association. Jackson, Miss. January 24-25, 1938. Dr. E. H. Durr, Secretary, Clinton Blvd., Jackson, Miss.

Michigan State College Short Course for Veterinarians. Michigan State College, East Lansing, Mich. January 24-28, 1938. Dr. Ward Giltner, Dean, Michigan State College, East Lansing, Mich.

Indiana Veterinary Medical Association. Severin Hotel, Indianapolis, Ind. January 25-27, 1938. Dr. W. B. Craig, Secretary, 1420 N. Alabama St., Indianapolis, Ind.

Missouri Veterinary Medical Association. Hotel Ruff, Marshall, Mo. January 25-27, 1938. Dr. C. L. Campbell, Secretary, 1817 Holmes St., Kansas City, Mo.

Keystone Veterinary Medical Association. School of Veterinary Medicine, 39th St. and Woodland Ave., Philadelphia, Pa. January 26, 1938. Dr. C. S. Rockwell, Secretary, 4927 Osage Ave., Philadelphia, Pa.

Kentucky, Conference for Veterinarians at University of. Lexington, Ky. January 26, 1938. Dr. W. W. Dimock, Head, Department of Animal Pathology, University of Kentucky, Lexington, Ky.

Kentucky Veterinary Medical Association. Room 106, Agricultural Engineering Building, Lexington, Ky. January 27, 1938. Dr. F. H. Riester, Secretary, Buechel, Ky.

Ontario Veterinary Association. Royal York Hotel, Toronto, Ont. January 27-28, 1938. Dr. W. J. Rumney, Secretary, 612 King St., W., Hamilton, Ont.

Southern California, Veterinary Hospital Association of. Los Angeles, Calif. February 1, 1938. Dr. L. B. Wolcott, Secretary, 1434 W. Slauson Ave., Los Angeles, Calif.

Virginia State Veterinary Medical Association and Conference for Graduate Veterinarians at Virginia Polytechnic Institute. Blacksburg, Va. February 1-3, 1938. Dr. A. J. Sipos, Secretary, 1102 State Office Bldg., Richmond, Va.

Connecticut Veterinary Medical Association. Hotel Bond, Hartford, Conn. February 2, 1938. Dr. Geo. E. Corwin, Secretary, State Office Bldg., Hartford, Conn.

Hudson Valley Veterinary Medical Society. Poughkeepsie, N. Y. February 2, 1938. Dr. J. G. Wills, Secretary, Box 751, Albany, N. Y.

New York City, Veterinary Medical Association of. Hotel New Yorker, 8th Ave. and 34th St., New York, N. Y. February 2, 1938. Dr. J. B. Engle, Secretary, Box 432, Summit, N. J.

Saint Louis District Veterinary Medical Association. Melbourne Hotel, Saint Louis, Mo. February 2, 1938. Dr. Milton R. Fisher, Secretary, 3678 Dover Pl., Saint Louis, Mo.

Houston Veterinary Association. Houston, Texas. February 3, 1938. Dr. Claude Canion, Secretary, 409 Link Rd., Houston, Texas.

Chicago Veterinary Medical Association. Hotel Sherman, Chicago, Ill. February 8, 1938. Dr. O. Norling-Christensen, Secretary, Box 12, Wilmette, Ill.

Southeastern Michigan Veterinary Medical Association. Medical Arts Building, 3919 John R. St., Detroit, Mich. February 9, 1938. Dr. F. D. Egan, Secretary, 17422 Woodward Ave., Detroit, Mich.

Illinois State Veterinary Medical Association. Hotel Abraham Lincoln, Springfield, Ill. February 17-18, 1938. Dr. C. C. Hastings, Secretary, Williamsville, Ill.

Alabama Veterinary Medical Association and Short Course for Graduate Veterinarians. College of Veterinary Medicine, Alabama Polytechnic Institute, Auburn, Ala. February 21-25, 1938. Dr. I. S. McAdory, Secretary, Alabama Polytechnic Institute, Auburn, Ala.

Louisiana Veterinary Medical Association and Louisiana State University Veterinary Short Course. Dalrymple Memorial Building, Louisiana State University, Baton Rouge, La. March 2-3, 1938. Dr. C. M. Heflin, Secretary, Box 1933, Baton Rouge, La.

American Veterinary Medical Association. Hotel Pennsylvania, New York, N. Y. July 5-9, 1938. Dr. H. Preston Hoskins, Secretary, 221 N. La Salle St., Chicago, Ill.

International Veterinary Congress

Dr. E. Gräub, General Secretary of the Thirteenth International Veterinary Congress, has forwarded to the A. V. M. A. office a supply of preliminary announcements of the Congress, to be held at Zurich-Interlaken, Switzerland, August 21-27, 1938. If you would like to have a copy, address your request to the secretary of the A. V. M. A. The official program of the Congress will be ready for distribution several months later.

Truth is generally the best vindication against slander.
—*Lincoln.*

THE X-RAY IN SMALL-ANIMAL PRACTICE*

By G. S. ELWOOD, *Chicago, Ill.*
Christensen Animal Hospitals

INTRODUCTION

In preparing this paper, I have purposely avoided technicalities and detailed procedures. It is my purpose to bring out the importance of the x-ray and the variety of conditions in which it may be used advantageously. As the subject applies to those who do not have an x-ray machine, but who may contemplate buying one, please bear with me if I seem too elementary at times. It is also hoped that some of the various methods and uses described below may be helpful to those of you who are now using an x-ray.

In covering the subject of x-ray in general, much detail has been omitted. Such subjects as precautions, projection, darkroom technic, positions and interpretation are all worthy of separate consideration. Suffice to say that anyone entering this field should become thoroughly familiar with the principles of x-ray and the operation of x-ray machines. Then use the knowledge gained from this study in purchasing the size most suitable for your purposes.

MACHINES

Today most small-animal practitioners operate an x-ray or have an agreement with someone nearby to take radiographs for them. In the latter case, they resort to a physician, an x-ray laboratory, or another veterinarian. Of the three I would recommend the veterinarian. He is better equipped and more experienced in small-animal work and can better judge the projection, position and interpretation. If necessary, work on the animal under the x-ray can be done at the time the radiograph is taken with the aid of the assisting veterinarian. This help is often not available from the physician or laboratory technician.

In my opinion the only disadvantage in owning your own machine is the initial cost. When this cost is spread over a period of years, the annual expense is small. There is little upkeep. Practically the only expense is for films and occasionally for developing and fixing fluids. There are few wearing parts on the machine. The tube is the only part that is easily broken or damaged. If the specifications as to its capacity are followed, it should serve its purpose many years.

*Presented at the seventy-fourth annual meeting of the American Veterinary Medical Association, Omaha, Neb., August 16-20, 1937.

FIG. 1. Needle in pharynx of dog.

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The disadvantages of using an outside machine are many. Naturally the cost per case is higher and you are more limited as to the amount of work you can do and the time you can consume in another man's office. Having a radiographic picture taken or the part fluoroscoped would be easy, but to do the work under the x-ray would have its complications. Unless an excessive fee were received, you would not be able to have the picture taken, anesthetize the animal, reduce the fracture, apply the cast and re-check. In addition, outside machines are not always available when you want them. I might state that most veterinarians find, on purchasing an x-ray machine, that their income from this source increases several fold in comparison to what they received when relying on an outside machine.

There are, in general, two types of machines, the portable and the stationary. In the hospital, I prefer the stationary type, especially if the table is included in the unit. A room can be set aside for its use, it is more presentable, and will do a wider range of work. With this type the room can be darkened and a fluoroscopic screen used in preference to the fluoroscopic view-box on the smaller machines. However, the view-box is a handy accessory on the large machines for use when operating, as the machine operator can direct the surgeon who would have to be working in a lighted room.

The advantages of the portable machines are that they are somewhat lower in initial cost, and are portable. The latter feature is of little value in small-animal practice, as the animals are almost invariably brought to the hospital. However, a portable machine would have a place in the hospital that has no room for a larger machine. Here a portable machine could be packed away when not in use. It is much simpler to operate and is shockproof. This feature is quite expensive in the larger machines. For small animals the small machine will do, but for fast exposures of 1/10 to 1/20 second, we need a large machine. The small machine has no potential control, *i. e.*, the high tension current is fixed and cannot be adjusted to a wide range of requirements. During the past two years, the number of machines offered the veterinary profession has increased greatly. They have also been improved as to size and capacity.

Therapeutic use of the x-ray in veterinary practice is not common. A few reasons are:

1. Special equipment is needed, *viz.*, a larger machine and a therapeutic tube.
2. The lack of demand for this type of work.
3. The results obtained do not warrant it.

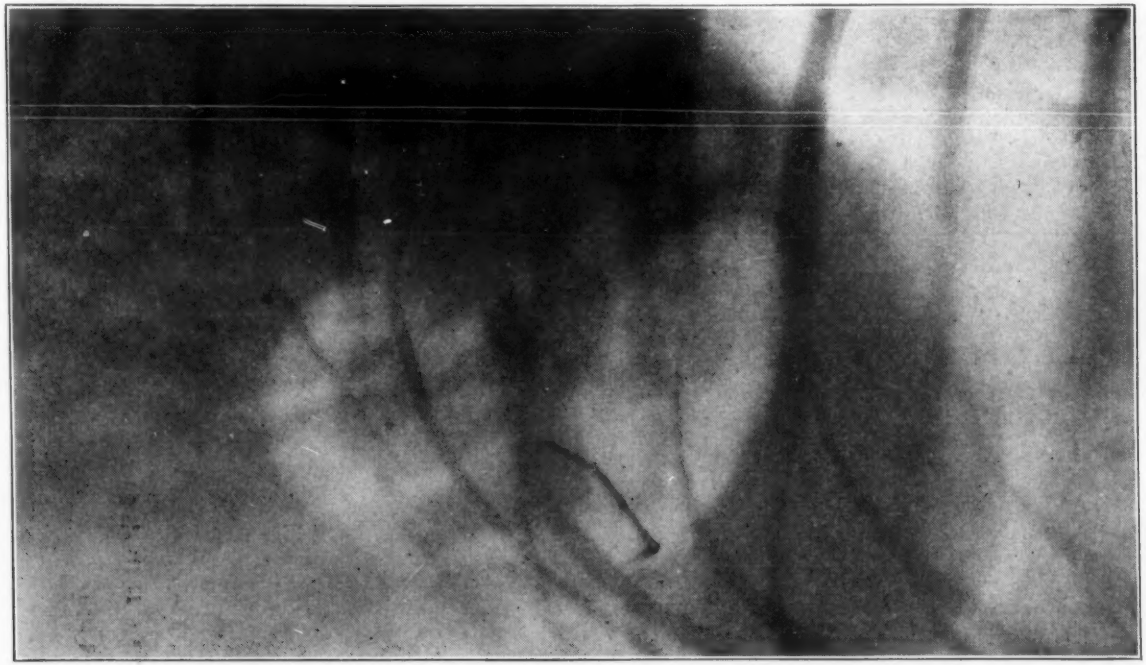

FIG. 2. Pin in stomach of dog.

FIG. 3. Bullet in toe of dog.

4. The cost to the client.
5. The danger of exposure to the operator.

In the future this field will be developed. It has possibilities and, of course, will give therapeutic results similar to those obtained in human practice. Skin reactions and the skin erythema dose on the shaved dog have been worked out.[1] It would be indicated in mange and actinomycosis, for malignant growths, and to produce sterility.

After purchasing the machine, a definite technic should be worked out in order to insure uniformly good pictures. A timer on the x-ray, a dark-room timer and thermometer, proper machine setting, and anesthesia of the animal in some cases are essential for good results. Generally anesthesia is not needed for cats or for the extremities in dogs, as a fast exposure can be taken.

For the heavier parts, where a longer exposure is necessary, especially if a small machine is used, anesthesia is necessary to quiet the animal and prevent a blurred picture. Panting, and even respiration during anesthesia, will cause a blurred picture if a long exposure is necessary. If it is desired to have the animal hold its breath, more satisfactory results will be obtained by pressure on the pharynx rather than by attempting to close the nostrils.

A permanent and concise record of each radiograph taken is a great aid in perfecting technic in addition to serving as a record. This is worked out very simply. A marker is placed on the film and x-rayed at the time the picture is taken. Thus, if it were the 407th plate, taken on July 8, 1937, with the right side of the animal exposed, it would read R-407-37-7-8. The plate number is placed on one end and the day of the month on the other end, as these are the ones most often changed.

A single horizontal line in a note-book divided into vertical columns will keep the data for this plate. Suggested headings reading across the page from left to right are as follows: Date, owner's name, whether fluoroscoped, radiographed, or both, hospital case number, the plate identification as described above, milliamperage used, peak kilivoltage, time in seconds, dark-room time and temperature, part of animal taken, weight of animal, for whom taken, *i. e.*, your own hospital or that of some other doctor, remarks, including your findings, and in the last column your fee, with the total carried down. One might also include an x-ray expense column if desired.

The above is primarily a machine record. By reference to it you can tell the best setting of your machine, including time in-

FIG. 4. Calculus in urinary bladder of dog. (Dorsal view).

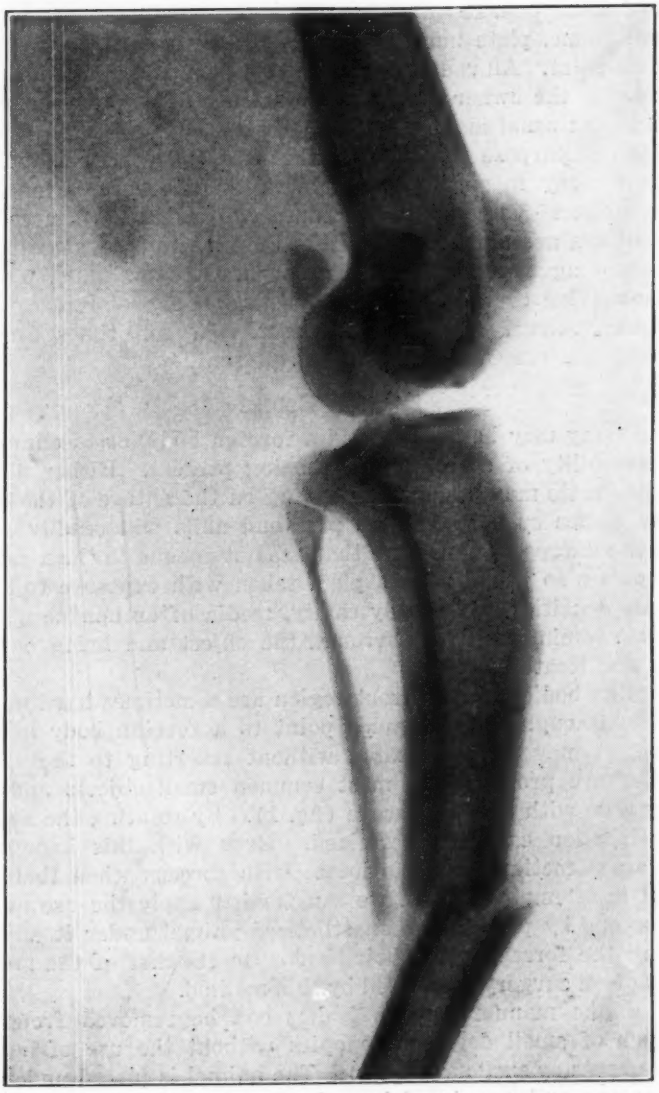

FIG. 5. Fracture of tibia and fibula in dog.

terval, for a certain part. The plate number is always transferred to the hospital case-card. If a record of this kind is kept, we can always make quick identification, whether we have the owner's name, plate number, plate, or x-ray record book as the starting point. All radiographs are kept as a part of the hospital record. If the owner insists on possessing a copy, a positive is made in the usual manner.

It is my purpose to deal with the uses and practical applications of x-ray in small-animal practice. Reference is made to other authors[2, 3] regarding procedure and technic. Its uses and applications are numerous. Within the limits of its uses it is a diagnostic agent against which no argument is valid. We must remember, however, that it supplements but cannot replace clinical observations. To satisfy a client, it is sometimes used to prove that a suspected condition is present.

Foreign Bodies

The x-ray may be used to find a foreign body, or to eliminate the possibility of a foreign body being present. Either fluoroscope or plate may be used, depending on the nature of the case. Dense bodies such as needles, pins and nails will readily show with the fluoroscope. Others that are not opaque to the x-ray or only partly so would need a plate taken with exposure to show various densities. If a body cavity, media of an opaque nature may be administered to surround the object and bring out its form and location.

Foreign bodies in the throat region are sometimes hard to palpate. Although the symptoms point to a foreign body in this region, it may not be located without resorting to the x-ray. Needles are probably the most common small objects and are easily seen with the fluoroscope (fig. 1). By rotating the animal their location can be determined. Even with this knowledge they are sometimes hard to locate with forceps when their removal is attempted. Here we can further apply the use of the fluoroscope by placing the anesthetized animal under it and inserting the forceps until their shadow meets that of the needle. Quite often surgery is avoided by this method.

In a like manner foreign bodies can be removed from the stomach of small dogs and puppies without the use of special instruments or surgery (fig. 2). The animal is placed under the fluoroscope and a pair of long forceps introduced through the esophagus into the stomach. What would otherwise be blind groping and prodding changes into easy manipulation. The forceps are moved towards the foreign body and when the two

FIG. 6 (above). Fracture of femur of dog. (Before reduction).
FIG. 7 (below). Fracture of femur of dog. (After reduction).

touch it is grasped and retracted. This method will quite often save the necessity of a gastro-laparotomy and is safer, especially in an animal in a weakened condition or in an emergency case.

I remember one of the first cases in which I made use of the x-ray. A valuable animal was presented with a history of having swallowed a pin, or at least it was thought he had swallowed one. While they were arguing the pro and con of the question I decided that here was a chance to use the x-ray. The fluoroscope showed a straight pin in the stomach and I decided to remove it by performing a gastro-laparotomy. However, as it turned out, I had to do only the laparotomy, thanks again to the fluoroscope.

In operating, the stomach was drawn through the opening in the abdominal wall and I tried to locate the pin by palpation, hoping to pull it through the wall of the stomach and thus avoid a gastrotomy. The pin could not be located due to the food and gas present, so, still grasping the stomach, the animal was again placed under the fluoroscope and by noting the position of the pin and my finger I could grasp the pin and pull it through the wall of the stomach. The latter was then replaced and the operation completed.

I have cited the above case as it illustrates several uses of the x-ray. First, it determined whether or not a foreign body was present. Second, it located the foreign body, and third, it aided in the operation. A similar case has been described in more detail and reported recently.[4]

Use of the fluoroscope will sometimes aid in removing foreign bodies in the odd cases that come to our attention. A small puppy was presented with colic and a history of having had worm medicine. In taking the temperature the thermometer struck a hard object in the rectum which could not be removed with an enema. The fluoroscope revealed a screw and screw-eye, the screw being inserted through the screw-eye in such a manner that both could not be retracted together. The animal was left under the fluoroscope and forceps inserted into the rectum, the screw withdrawn from the screw-eye and out through the anus. The screw-eye then was withdrawn. It would have been difficult to use a rectal speculum on a dog of this size.

In one instance I x-rayed the foot of a large dog that had been under treatment elsewhere for a period of two months for "ulceration of the toe." The radiograph revealed a 22g bullet lodged in the pad near the third phalanx (fig. 3). This was easily removed and the dog recovered rapidly.

FIG. 8. Fracture of pelvis of dog, with hip and sacrum dislocated.

If foreign bodies are suspected in the intestinal tract and the examination is negative, the animal is fed a bismuth or barium meal to bring out objects that are not opaque to x-rays. The bismuth or barium surrounds the object, revealing its shape and location. For small objects such as fish bones in the esophagus, the animal is held in the standing position and fluoroscoped as the diagnostic agent is administered.

In complete obstruction of the intestinal tract from any cause, foreign or local, we see gas collected from the point of obstruction forward.

Bismuth and barium are used also as aids in the diagnosis of ulcers, tumors, cancer, diverticula, and strictures of the alimentary canal. In cases of persistent vomiting we may find that the bismuth has not reached the stomach, but is still in the esophagus. By the shadow it casts we can tell whether it is an esophageal diverticulum, a stenosis of the cardiac sphincter, or a stoppage due to a foreign body.

In most cases drugs have to be administered to bring out stones in the gall-bladder and in the urinary system. I find they are more often indicated in the latter. We cannot inject through the ureters into the kidneys as in man, so it is necessary to use the intravenous route. Pathological renal conditions as well as kidney stones can be shown by this method. An easy and economical method used in the diagnosis of stones in the urinary bladder is to inject air. The larger stones of the urinary bladder are sometimes large enough to show without staining around them and of course they usually can be palpated (fig. 4).

Skeleton

One of the greatest uses of x-ray is in fracture work. This is where it works most easily and best, due to the density of bones. True enough, we can palpate and diagnose most fractures, but even in these easy cases a picture of the broken bone with its jagged ends convinces the client of the seriousness of the case and pictures the condition better than the words of the doctor (figs. 5, 6 and 7). Sometimes it is a revelation even to the veterinarian.

Quite often an animal is presented showing lameness but no history or symptoms which would indicate a possible cause. The examination will often prove negative unless x-ray is used to expose a green-stick fracture, luxation, or foreign body.

In fracture cases the x-ray is used to diagnose the case or if the diagnosis is obvious to give us a picture of same. Quite often what is difficult to picture in one's mind by palpation is perfectly clear when palpating after seeing a radiograph of the

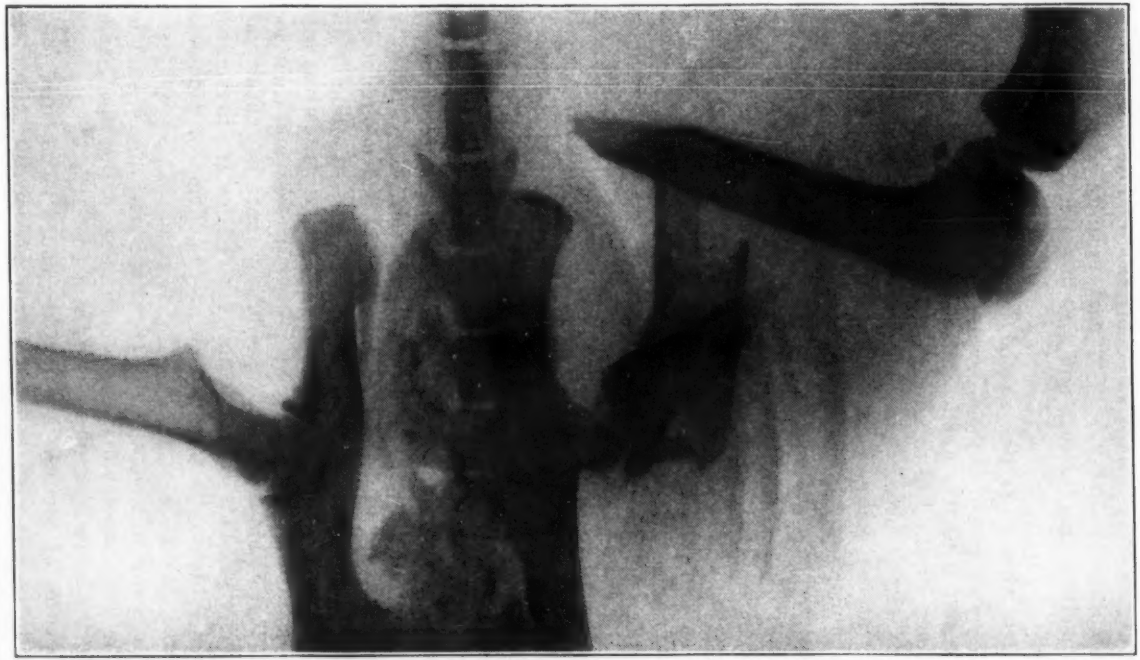

FIG. 9. Fracture of femur and pelvis in a cat.

part. We may find a second fracture that otherwise would have been overlooked. This is especially true of injuries in the pelvic region (figs. 8 and 9). The part is quite often fluoroscoped when setting the fracture and a radiograph taken after the cast is applied.

Often what looks like a good job is rather ragged under the x-ray. In cases of dislocation, it is often desirable to x-ray the hip region after the application of a cast because of the marked tendency of the hip to slip. This also holds true in a fracture of the femur when there is considerable swelling present. A callus at the point of fracture will occur in ten days and will show under the x-ray in about 18 days.

Besides the cases mentioned, there is hardly a part of the bony structure that is not radiographed at some time or another. In accident cases which result in posterior paralysis, it is often necessary to use the x-ray to locate the point of injury, especially if it is located in the vertebral column. The pelvic region is a part most frequently radiographed, as it seems in most accident cases a dog can get everything clear except his posterior extremity. A compression band around the animal in the lumbar region will help give a picture clearer in detail, as it will allay movement, reduce thickness of the part, and displace the intestines anteriorly. This is an important factor. It is also well to have the bladder emptied. Other conditions x-rayed are rickets, congenital deformities, bone tumors (fig. 10), and exostoses.

Diagnosing pregnancy by use of x-ray in small animals is not favorable until the last two or three weeks of gestation, as the bony structure of the fetus is not developed enough to cast a shadow until this time. However, breeders of valuable animals are agreeable to the use of x-ray at this time as it gives information regarding the number of fetuses present and their location (fig. 11). This is an aid, especially if there is difficulty at time of delivery. This region is also x-rayed for the presence of retained fetus, cystic ovaries, and any condition of a questionable nature.

The x-ray will show hydrothorax without any special technic as the fluid present displaces the organs of the chest, and especially the lungs by compressing them (fig. 12).

In cases of ascites, in which the cause is obscure, the x-ray may show a foreign body or tumor present. If the picture is taken with the animal standing we can show the fluid level. When radiographing for either hydrothorax or ascites, the breath is held by pressure on the pharynx.

FIG. 10. Bone tumor, distal end of tibia, in a dog.

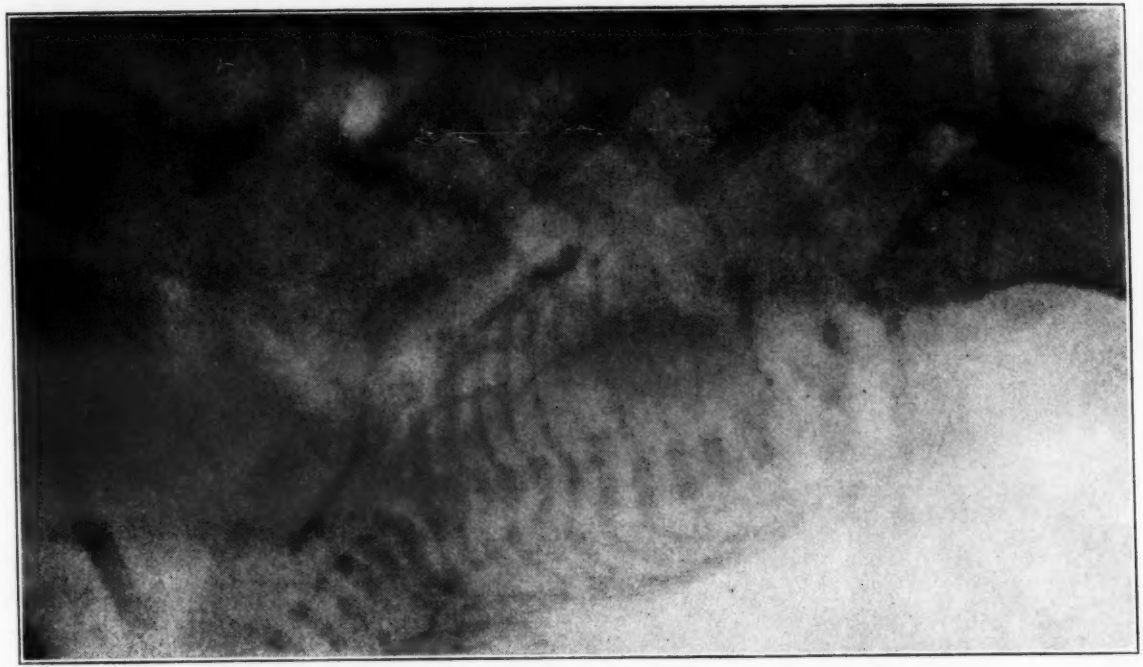

FIG. 11. Full-term fetus in a bitch.

FIG. 12. Hydrothorax in a dog. Note absence of lung shadow on left side.

The x-ray is used also in cases of rupture or suspected rupture of the diaphragm, especially if the fluoroscope has shown an interesting picture. The heart and stomach cast a definite shadow and a rupture of the diaphragm will show the heart-beat and its effects on the abdominal contents, especially if the heart or the stomach is not in its normal position.

The Fluoroscope

The fluoroscope will be used less and less as one becomes more familiar with the operation of the x-ray. Several small pictures of a part, with the patient in different positions, are necessary because a radiograph is a shadow picture and does not show depth. However, the fluoroscope is indispensable and has many uses. The operator should use proper precautions not to overexpose himself. While it will not show the detail available in a radiograph, it is an aid in locating the seat of the trouble and to a certain degree will help in studying the affected area.

An extensive study of the entire body can be made with the fluoroscope and more cheaply than by radiographing. It will aid in giving the best position in which to have the animal to radiograph for a detailed study of a certain part. It will quickly show most fractures and most foreign bodies. It is very helpful in studying the alimentary canal when bismuth or barium is administered. It can be used to watch the daily progress of foreign bodies such as needles or pins when attempts are not made to remove them surgically.

Summary

From the data in the x-ray data book previously described, I have classified the following conditions for which the x-ray was used. This record covers a period of 2½ years.

Head: Fractured upper or lower mandible. Fracture of the skull. Cancer and tumors of the sinus, mandible, eye, and glands. Foreign bodies, especially needles and pins, in the pharyngeal region. Teeth. Swollen glands, both swollen and abscessed, for tumors, calculi and foreign bodies.

Neck: Cervical vertebrae. Foreign bodies. Glands. Esophageal diverticulum.

Thorax: Hydrothorax. Foreign bodies. Ruptured diaphragm. Fractured ribs. Diseases of the lungs.

Abdomen: Stenosis of cardiac sphincter. The stomach for foreign bodies and tumors. Ascites. The intestines for foreign bodies, cancer, and obstruction. The urinary bladder. Diagnosis

of pregnancy, especially in heavy animals; also for pyometra and extra growths of the ovaries and uterus.

Fore limb: Lameness showing luxations, green-stick fractures, or foreign bodies. Fractures of bones here present. Exostoses. Bone tumors.

Hind limb: Same as for fore limb.

Pelvis: Acetabulum. Fracture of bones of pelvis. Dislocated sacrum.

Rickets, deformities, and a condition of the hip seen mostly in fox terriers for which I have no name, were also noted. Others have called the hip condition "surgical neck," "osteo-chronditis deformans" and "fox terrier disease." It is a flattening of the head of the femur and a building up of the shaft, the animal showing about the same symptoms as when the hip is out of joint. It is probably due to arthritis, rheumatism or injuries. Treatment is complete rest, no splint, recovery usually occurring in two to three weeks.

Time and space have permitted discussion of only a few of these conditions. I cannot add the gall-bladder and kidneys to the above list, as I have not as yet used contrast media to x-ray those two parts.

Thus we see that the x-ray and fluoroscope have many uses in small-animal practice. They will help the veterinarian in the routine work of his hospital and will help him to turn out better work. They will often help clear up difficult diagnoses, save time, expense and even life in certain cases.

The time will soon arrive when our clients will expect this service in our hospitals, just as they now expect it in the field of human medicine. The objective of this paper will have been reached if it has stimulated your interest in the use of the x-ray in small-animal work.

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[2]Eastman X-Ray Laboratory Manual. (Eastman Kodak Co., Rochester, N. Y.)

[3]Pillsbury, H. C.: U. S. Army X-Ray Manual. (Paul B. Hoeber, Inc., New York, N. Y.)

[4]Winchester, B.: Allotriophagia in a dog. Vet. Med., xxxii (1937), 6, p. 221.

Discussion

Dr. H. M. Spangler: That was a very excellent paper, and there is no question but that the x-ray machine is a wonderful asset to the medical and veterinary professions.

I wish to take this opportunity to call to the attention of the veterinary profession the fact that the x-ray machine is not a harmless device. At the Oklahoma City meeting of the A. V. M. A., Mr. George Wantz

pointed out that two veterinarians in attendance showed definite lesions of x-ray burns. So, you men who are taking a number of x-rays and fluoroscopes each day should familiarize yourselves with the fact that you can get x-ray burns, that the x-ray is a cumulative poisoning and that you should know something about its potential possibilities. We do not want any veterinarians to be martyrs, such as human medicine has had, to contribute to our knowledge of x-ray burns. (Applause.)

MEMBER: It would be a good idea if Dr. Elwood would tell us how to set an x-ray machine so that burns may be prevented. I should like to have that explained. It is easy to burn one's self, and many times the burn doesn't make itself known at the time. May I ask him how he would set a machine? It will take but a few moments. I believe that information will be helpful to a great number here. I know that when I first began to operate an x-ray machine that fact was not explained to me, and I received a burn.

DR. ELWOOD: It is not so much a matter of setting the machine, but the precautions taken on the part of the operator. The x-ray is the same as light, traveling, usually, in a direct line. We set our machine for the part to be worked on, regardless of exposure.

X-ray burns are received in cumulative doses, but the occasional use of the machine would not have any harmful effects. If an operator were doing a great deal of work with the machine, he would then have to take precautions, especially if he were using the fluoroscope, because when he uses the fluoroscope it is a case of one or two minutes at a time that he is exposed, unless he protects himself. This can be done by using lead gloves and a lead apron; or, if there are sufficient operators in the hospital, they can take turns at the machine.

On therapeutic work, and where remote control can be used, the operator stands back of a lead-lined screen. Anyone operating it, as I mentioned a while ago, can understand the explanation better if he gets a good book about it and if he will read it thoroughly. The first thing to understand is the necessary precaution to be taken, not only to exposure but the way to get around the high-tension current, because it is quite dangerous.

Importations of Breeding Animals

The report of the Chief of the Bureau of Animal Industry for the fiscal year ended June 30, 1937, shows that the certification of animals imported into the United States for breeding purposes included 792 horses, of which 441 were Belgians, 95 Clydesdales, 35 Suffolks and 75 Thoroughbreds. The 146 others were divided among eleven breeds.

Among the cattle imported, there were 6,121 Holstein-Friesians, 1,780 Herefords, 1,542 Ayrshires, 1,244 Jerseys, and 1,121 head belonging to other breeds. Other importations included 2,365 sheep, eight goats, 123 swine, 15 cats and 983 dogs.

It was pointed out in the report that the year was a notable one in that the importations of horses increased 8 per cent over the preceding year, sheep increased 48 per cent, and swine 251 per cent.

SOME COMMON CONDITIONS ENCOUNTERED IN CAT PRACTICE*

By F. F. PARKER, *Des Moines, Iowa*

Humane and proper treatment of diseases of cats is a specific responsibility of the veterinary profession—a field of practice that offers a fertile source of revenue to those who will properly qualify and equip themselves to take care of it.

Cats have their place in the economic scheme of things, primarily as the most efficient destroyers of rodents and, secondly, as house pets, especially in urban areas unsuitable to proper environment for dogs. Cats are inexpensive pets and, while not exactly sporting companions for men, women find much pleasure and pride in good cats despite the old tradition associating cats with "old maids," witches, haunted houses, and so forth.

HANDLING

Twenty years ago, possibly because of my life-long affection for dogs, I would hardly have believed that I would some time present the subject of cat diseases before a group of veterinarians. However, constant association with any kind of animals removes many dislikes, and this is especially true of the veterinarian who includes cats among his daily patients.

Very few cats ever bite or scratch except through fear. We often hear the remark: "I don't like cats." My reply to this is always the same: "You don't *know* cats." However, it does take patience, tact, ability and experience to manage, handle and treat these fiery little animals properly. Cats are, by nature, timid and suspicious but, once one has gained their confidence, it is possible to examine the mouth, ears, take temperatures, scale teeth and do minor surgery without resort to force. Have the owner place the cat on the table, and then stroke and handle it until it is at ease. One slip of impatience on your part may cause you to get a going over long to be remembered.

If ever an animal had a motto it is the cat, and this motto contains but three words: "Don't force me." Be patient and, at the first signs of restlessness, halt all manipulations and reassure the patient by petting and quiet persuasion. With proper judgment these "starts" and "halts" may be repeated many times. Where manipulations or treatments are to be long drawn out or painful, anesthesia should be given. Nembutal, either

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intravenously or intraperitoneally, or straight ether is safe and effective.

Always remember that there is a certain amount of stigma attached to being scratched or bitten by a patient—either feline or canine—and, further, clients may twit you about such mishaps for a long time.

External Parasites

Ear-mites: Head shaking and scratching, coupled with dry débris in the ears, leads one to suspect ear-mites—parasites easily seen through the low power of the microscope. Treatment is simple and effective. Fill the ear with any good commercial canker compound containing alcohol, tannic acid and boric acid. Massage well and, after you have rid the ears of all débris, dry and fill the external ear with derris root powder and sprinkle it liberally over the head. This dusting should be continued over a period of several days.

Sarcoptic mange: It is not uncommon to see both ear-mites and sarcoptic mange mites infesting the same patient. However, the typical thick skin with characteristic scabby incrustations on the head and neck means mange. Prognosis, even in advanced cases, is favorable. While the 1:20 lime-sulfur commonly used on canine patients is effective, we prefer to use the old Danish itch cure, a mixture that gives uniform results. This compound is composed of potassium carbonate 5½ ounces, oil of tar 5½ ounces, flowers of sulfur 1 pound and oil of rape seed 7 pints. Three applications at intervals of three days will usually effect a complete cure. Always instill a little yellow oxide of mercury ointment on the eyes before this treatment is applied.

Ringworm: Ringworm is a contagious fungus infection affecting cats in the same manner that it does other animals, including man—a valid reason for not exposing children to cats infested with ringworm. The causative fungus is easily identified by placing skin scrapings in a 10 per cent solution of potassium hydroxide prior to microscopic examination. Ringworm lesions yield readily to treatment with 1:500 solution of mercury bichloride in alcohol, or iodine 1 part with glycerin 2 parts. Sanitary precautions, especially in the veterinary hospital, should not be overlooked.

Warbles: These parasites very much resemble the common ox warble but are darker in color and slightly smaller. They belong to the species *Cuterebra.* These larvae commonly infest the regions of the neck and shoulders, though we found one firmly lodged in the nostril of a kitten. Their presence is characterized

by a small puncture hole resembling a bite or bullet wound and, as is the case with ox warbles, a tenacious exudate is constantly exuded. Cat warbles are easily removed with a pair of tweezers. After their removal and cleansing the wound, healing takes place very readily.

Internal Parasites

Cats harbor most of the internal parasites common to dogs and other carnivorous animals, namely, hookworms, roundworms, tapeworms, whipworms and coccidia. Other less frequently encountered parasites are bladder worms, echinococci and trichinae. Of the internal parasites, hookworms and coccidia are the most serious. Outbreaks of so-called "distemper," especially among farm cats, are usually traceable to hookworm infestations.

Tetrachlorethylene is the drug of choice for both hookworms and roundworms and, if one does not use capsules combined with Epsom salt, this drug should be given one hour after treatment to insure elimination and prevent toxic absorption.

Arecoline, in dosages ranging from 1/20 to 1/10 grain, is given for tapeworms. Follow it in 30 minutes with a soda enema. Whipworms are very difficult to eliminate but persistent treatment with santonin appears to be the best known remedy. Organic iodine (methenamine tetra-iodide) is the only drug that I have found effective in ridding cats of coccidia. One must use exercise constant vigilance in disposing of and burning all excrement.

Bacillary necrosis: This trouble is characterized by a peculiar blue or purplish swelling which, when lanced, yields a bloody, mucopurulent discharge. The feet, head, neck and tail are the common sites of this infection. If the exudate is stained with gentian-violet, the typical rod-shaped organisms responsible for the infection will be noted. This infection tends to shift or metastasize to different areas. The most important point in the treatment of bacillary necrosis is to cut freely or curette away every particle of diseased tissue with the same thoroughness that one would exercise in extirpating a malignant growth.

After thorough surgery, the area should be swabbed with a light coat of tincture of iodine, to be followed by an application of colloidal silver ointment. Where the tail is badly infected, one should amputate without hesitancy to curb further progress of the disease. Prognosis in bacillary necrosis cases is always guarded.

Vincent's disease: Spirochetes, the causative factor of Vincent's disease or specific gingivitis of cats, probably exist as

saprophytes in the mouths of *Felidae*. Accumulation of tartar is one of the predisposing causes. Badly infected cats show marked constitutional disturbance.

Remove all tartar deposits, paint the gums daily with 2 per cent chromic acid solution and build up the resistance of the patient with suitable arsenical alteratives.

Infectious feline gastro-enteritis: This plague is without doubt the most contagious and fatal of all cat diseases; also the most dangerous to hospitalize. It is ushered in by a high temperature —often as high as 107° F. — great prostration, vomiting and dysentery. Deaths may occur in from two to five days. Patients afflicted with this virus-borne contagion are prostrated and sit with hunched body and lowered head. Owing to the intense, bile-stained vomitus, the disease is known to laymen as "yellow vomit." It is almost 100 per cent fatal in growing kittens, either with or without treatment. Antifeline enteritis serum, homologous type, is a very good preventive and, I believe, has considerable value as a curative agent.

Common Disorders

Hair balls: At shedding time, long-haired cats swallow variable amounts of hair. Sometimes they pass this hair by the natural route or, again, they may expel it by vomiting.

A cat with a typical gastric hair ball may easily be mistaken for a case of feline enteritis. However, the absence of high temperature permits differentiation of these two conditions. Where the hair increment is in the bowel, arecoline may be used in 1/10-grain doses, followed with a soda enema in about 30 minutes. If results are not obtained, one is justified in using gastro-intestinal lavage.

Incidentally, in regard to vomition, it has been my observation that a cat can "throw it farther and harder" than any other species of domestic animal.

Conchal hematoma: When a cat is presented with an ear swollen up like a balloon and with no other visible lesions of the ear, one may be quite sure that you are dealing with a hematoma. Lance the inside surface and wash out all serum and blood clots; then make an elliptical incision sufficiently large to allow the exudate to drain freely. Place a boric acid pack around the head with the ear pressed closely over the top of the head. Keep this pack in place until all hemorrhage ceases. Remove, dry and tape the ear over the head with moleskin tape, having first made an opening in the tape, the same size as that in the ear, for drainage purpose. Wipe off excretions daily and, in a week, the wound

will usually be healed without curling or cauliflower-like excrescences.

Epilepsy: Epilepsy is rather common in kittens. The onset may be sudden, the affected kitten running blindly and frantically with saliva dripping freely. This major disturbance is followed by a period of complete prostration and semi-coma. In the absence of a positive fecal examination for parasite eggs and after exclusion of digestive disturbances, one is justified in making a diagnosis of true epilepsy.

We have found no effective treatment for this condition other than good food and care. Many kittens will outgrow the epileptic tendency.

SURGERY

Before any operation involving the peritoneum is performed on the cat, a careful fecal examination should be made and parasites eliminated, if one wishes to avoid complications and possible unexplained death losses from laparotomies.

Castration of male kittens should be done at about six months of age, and at this age no anesthesia is necessary. If males are neutered after one year of age, they may continue to possess a characteristic, strong "uric" odor.

This paper involves cats rather than dogs but, with your permission, I would like to digress for a moment and discuss castration of male dogs—an operation that in past years caused us considerable difficulty. The following method has proved practical and successful:

Every aseptic precaution must be taken. The incision is made anterior to the scrotum. Catgut ligatures are used on the spermatic cords and the skin incisions are closed with silk sutures. A Johnson & Johnson Duo Patch is applied and a Lacroix collar placed around the neck. The stitches are removed in six days.

Spaying: Spaying cats is less difficult than spaying bitches. The anesthetic may be either nembutal or ether. All instruments should be sterilized, the seat of operation shaved, the skin painted and a protective sheet applied. The incision is made about one inch posterior to the umbilicus and, if spaying is done before the first heat period, a very small incision is all that is necessary. Incise the peritoneal cavity, then elevate the patient and hook each tube. Return the patient to a horizontal position and always do a complete hysterectomy. We use a single 00 catgut suture for peritoneum and muscle, with a single skin suture of silk.

If the cat is older, it may be necessary to make a larger opening and, therefore, use more sutures. Close suturing excludes the after-danger of hernia. All cats should be hospitalized for one week after spaying.

Obstetrics

Obstetrical procedures in cats are no different than in bitches, except that greater care is necessary as the cat's resistance is not so great as the canine matron. They also give up more readily. In dystocia cases, where the presentation is normal, the uterus should be filled with sterile mineral oil and the patient observed for one hour. At the end of this time, if there are no results, resort to forceps.

Where the queen and kittens are valuable, cesarean section is successful if done early. The technic is the same as that used on the canine patient. These are true hospital cases. The anesthetic of choice is straight ether, and the low operation is the one of choice.

Other Troubles

Cats very often swallow needles, fish bones and other sharp, penetrant objects which lodge firmly in the throat. The x-ray is invaluable in the detection and removal of these foreign bodies.

Calculi are very common in old neutered toms. The stones are usually found lodged within an inch of the end of the penis. Try to remove them with a small, hard rubber bougie, or, sometimes, a loop of silkworm gut may serve as an effective snare. These methods failing, split the ventral surface of the penis and relieve them in this manner. If the stones are lodged near the ischial arch, place a catheter as far forward as you can, cut down on the stones and remove them. Do not suture but treat the incision as an open wound. Methenamine 5 grains and lithium citrate are given daily.

In cutting away matted hair on cats—and many come in so matted that when the work is completed they are bare in numerous places—use a comb under the hair and clip above the comb. Otherwise, you may be embarrassed to find that you have snipped off an inch or so of skin.

Feline Peculiarities

Cats rarely, if ever, have rickets, rheumatism, chorea or tetanus or become poisoned by snake bites. The cat's nails are always sharp, for he never allows them to touch the floor while walking. He has 30 teeth which are marvels of sharpness. The pupil of the eye is more contractile than in any other species, and

the sympathetic nervous system shows special development. The gestation period of cats is about the same as in canines, but cats may have from three to four litters of kittens a year. The heat period lasts from 3 to 15 days. Cats possess tactile papillae on the tongue similar to those noted in cows. These enable them to lick and clean themselves and to obtain the marrow from bones.

In the treatment of cats beware of all coal-tar products both externally and internally. Remember, too, that strychnine is dangerous even in doses as low as 1/200 grain. Morphine crazes cats but apomorphine is not poisonous in proper dosage, though not always certain to cause emesis.

In this discussion we have not touched on the subject of rabies in cats and possibly other diseases worthy of discussion. However, we trust that this discussion has tended to create some interest in an important and worthwhile phase of practice. The animals that Kipling so aptly referred to as "the little tigers of the boudoir" play an increasingly important role in the daily activity of the small-animal hospital and, to a lesser extent, in the field of general practice.

Discussion

Dr. L. H. LaFond: If my memory serves me correctly, this is the first time that I have had the pleasure of listening to a paper on cats, presented at an American Veterinary Medical Association meeting.

I feel that Dr. Parker has done a very creditable job in placing his experiences with the feline on paper in such a clear and concise manner. I am of the opinion that this article will prove very valuable as a reference to many of us when it is published in our Journal. It will be remembered, when filed away for future use, as a truly practical paper, valuable almost daily in our contact with the feline.

Referring to my very limited knowledge of cats in attempting to discuss this paper further, I must say that Dr. Parker has covered the different headings of his paper thoroughly, leaving little for addition, correction or criticism. I have a few thoughts on this subject, which I will now attempt to present, hoping that you will find them worth listening to. In so doing, I will attempt to follow Dr. Parker's paper; that is, his different headings will be taken up in the order in which they appear.

We will recall that cats enjoy crawling under something; that is, they enjoy being covered up. With this thought in mind, in the handling of highly nervous or irritable cats, we have found the use of a very heavy towel helpful. We place the towel over the animal in such a manner that whatever part of the body is to be worked on, is exposed, and the remainder covered, and when so held by an assistant, it will, in the majority of instances, produce a quieting effect on the patient. Too, there is less danger of being scratched or bitten.

Our routine treatment for otitis in cats is very simple, consisting of cleaning the ears, at about four-day intervals, or as indicated, with swabs saturated with therapogen, wiped dry, followed with a mild

antiseptic powder sprinkled in liberally each day. We usually use bismuth-formic-iodide powder.

For mange in cats, we usually use colored sulfur ointment freely applied each day and rubbed in well, taking in more than the actual areas showing. We often use scarlet oil on cuts, abrasions and non-parasitic areas (dermatitis), freely each day, without any apparent toxic complications.

In treating ringworm infestations in cats, we have found eczema lotion satisfactory. We apply this liquid once or twice, daily depending upon the severity of the infection. I believe Dr. Milks, of Cornell, first used this product. It consists of the following: tannic acid and salicylic acid, 1.7 ounces of each, dissolved in a quart of rubbing alcohol.

Apparently warbles in cats is a rarity in the Detroit area, or perhaps we have failed to recognize them because I cannot recall having seen such a condition in cats.

We have no hospital record of whipworm infestation in cats. Our procedure is similar to the one outlined by Dr. Parker in treating other types of worm infestation. Chandler's iodine in very small doses has worked well in coccidiosis.

I have nothing to add to Dr. Parker's remarks on bacillary necrosis nor on Vincent's disease. We have found both of these conditions only infrequently in our practice.

Anti-mixed infection serum (feline), either heterologous or homologous, has been effective with us in acute gastro-enteritis. We have used foreign protein, with less favorable results. I believe that medication symptomatically is indicated too.

Our recommendation for the prevention and also the expulsion of hair balls in cats is olive oil in tablespoonful doses given as needed or indicated. Some cats will take olive oil, in which sardines have been packed, out of the can of their own volition. This simplifies matters immensely when cats will so coöperate.

Too many of our conchal hematomas have resulted in permanently deformed ears when healed. I am anxious to try Dr. Parker's technic. His method seems right.

I am in accord with Dr. Parker on epilepsy in cats. If you cannot find the cause or correct the condition, make a diagnosis of epilepsy and you will be on the right track.

We always use ether to anesthetize males for castration, and recommend that the operation be performed as soon as the organs have descended.

We, too, use the median line when spaying cats. But, I candidly feel that the flank operation has its advantages. I know of several veterinarians who use this area with excellent results.

Dystocia in cats, as Dr. Parker has stated, is no different from that in bitches. We attempt to follow the same procedure as in dogs. I do believe that pituitary extracts are more positive in their action on cats than on dogs. We give about 0.5 cc to the dose and repeat as indicated.

Dr. Parker's paper, under the heading of "Other Troubles," mentioned urinary calculi. I wish to add that we have found that full doses of vitamin A, such as haliver oil or other concentrated vitamins, very helpful as an after-treatment in preventing a recurrence of this condition.

In removing badly matted hair on cats, we have found that if the animal is given a general anesthesia, the mats may be combed out thoroughly. After the job is completed, the animal will surely look terrible. This is particularly true if the hair is completely matted. We believe that it is a good plan to forewarn the owner of this and thereby avoid an unpleasant surprise.

Dr. Parker's paper makes mention of rabies in cats. My comment on this is that the Detroit area is considered to be a hot-bed for this disease and we have no end of trouble with this condition in dogs. But, I have yet to see a positive case of rabies in a cat, nor have I heard of one in my territory. This disease, I believe, has been found in the feline, but only rarely.

On the Job

The Eastern Iowa Veterinary Association draws a hand for its motto and for its long and useful activities. Its motto runs:

"TO HELP MAKE EASTERN IOWA THE SAFEST PLACE IN THE WORLD TO INVEST MONEY IN LIVE STOCK."

The oldest and the largest sectional veterinary association in the world, is the claim made for it, and so far as we are aware, justly made. The association has a definite, practical program which it presses constantly, and through its persistent publicity does much *to prevent* animal disease and its spread. Thus a statement just issued to the newspapers:

> Hog cholera has recently created considerable havoc among the droves of hog-raisers in several sections of eastern Iowa where the disease for many years has struck the least. In regions where there are so many cholera-susceptible swine, hog cholera makes fast and devastating progress through the countryside. Owners of susceptible swine in all sections should suspect hog cholera first when their droves sicken at this time of year.

This association is holding its annual meeting at Cedar Rapids, October 12-13. It deserves a nod of approval from live stock producers.

What kind of a live stock industry in this country today, think you, without the study given to animal diseases by a competent, well trained veterinary profession? Who discovered how to stop hog cholera for instance? —*Daily Drovers Journal.*

Prospective Subscriber

The following communication was received from a party in one of the southwestern states, who signed his name with the degree "V. S. M. D."

> Please in close find 25c in stamps for sample coppiee of the American V Med Association and alls price per year and I will sind you the money at once.

Subscription respectfully declined.

I take it to be a principle of life, not to be too much addicted to one thing. —*Terence.*

UTERINE INERTIA IN CANINES*

By FLOYD PERRIN, *Lincoln, Neb.*

The objective of the writer in preparing this paper has been to present an interpretation of uterine inertia as it is known to occur in the bitch.

Similar to other morbid conditions occurring in the dog, there are very few statistical data of investigational work for our guidance. Neither is there much in regard to normal processes. In the presentation of a paper of this nature, which has little or no precedent, it has occurred to the writer that the listener or reader might be interested in knowing the author's version of the normal, as well as the abnormal. As a common understanding of the process of normal parturition is pertinent to the topic to be discussed, a brief review of the same will be presented.

Obstetricians and physiologists have very little to offer in this connection. As far as multiparous animals are concerned, most of our information originates from observations of practitioners and fragmentary reports of research work on lower animals in more or less allied fields.

It is generally agreed that the average duration of pregnancy in the bitch is 63 days. Williams[1] reports a minimum of 58 days, and a maximum of 65 days; Campbell[2] a minimum of 58 days and a maximum of 72 days; Müller and Glass[3] a minimum of 53 days and a maximum of 71 days; the writer, a minimum of 56 days and a maximum of 70 days. It is to be assumed that these reports refer to the whelping of healthy, live pups.

As the termination of pregnancy approaches, the vulva enlarges, milk appears, some psychic phenomena[2-4] occur, such as excitement, restlessness, tearing up bedding to make a nest, and seeking a place to be alone. This may last from three or four up to 24 hours. Usually, within a few hours labor begins. Some dogs will give birth quickly at intervals of a few minutes, while others may take 24 hours or longer, with irregular delays between births.[2] Sometimes a pup may be carried for several days and the bitch seem normal and then, without any ill effects, finally give birth.[2]

When the ordeal of whelping is completed, the mother usually shows an attitude of contentment and will become fully occupied with cleaning and nursing her young.

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*Presented at the seventy-fourth annual meeting of the American Veterinary Medical Association, Omaha, Neb., August 16-20, 1937.

As to the actual mechanics of parturition in the bitch, very little is known. Physiologists have not given us very much enlightenment. Nearly everything found in the literature on the physiology of parturition pertains to large animals and the human, excepting reports of investigators doing experimental work on animals in the field of reproduction. Some have assumed that the process is similar in all species of animals. Even if we were to grant that the theories of labor as applied to large animals and the human, as published, are correct, one still would not be justified in thinking that the same ideas could be applied in their entirety to multiparous animals, as there are marked anatomical differences to be considered, as well as other specific variations.

Labor has frequently been referred to as occurring in three stages[1-5]: first stage, dilatation of the cervix taking place; second stage, expulsion of the fetus; third stage, expulsion of the placenta and involution of the uterus. These stages of labor, as usually described, may take place in this manner in large animals and the human, but it is doubtful if labor takes place similarly in the bitch. According to personal observations, the writer is led to believe that the first stage, or dilatation of the cervix, which dilates in all cases in from a few hours to 48, before expulsive efforts are noticed, should not be included in the act of parturition, but it is just as likely to be brought about by the same influences that produce other physical changes noticed toward the termination of pregnancy, such as enlargement of the breasts, relaxation of the pelvic ligaments and vaginal wall and hypertrophy of the vulva. Some reasons for this deduction will be mentioned later in the paper.

There is very little available experimental knowledge of the nervous mechanism of parturition. The most important observation on this point is one written by Starling,[5] who relates an experiment by Goltz:

> * * * in which this physiologist observed the normal occurrence of heat, impregnation and parturition in a bitch whose spinal cord had been completely divided in the dorsal region during the previous year. On the other hand, destruction of the lumbo-sacral cord completely abolished the normal uterine contractions of parturition, so that this act must be regarded as essentially reflex, presided over by a controlling centre in the gray matter of the cord.

Muscular contractions seem to be stimulated by the presence of a fetus at the pelvic inlet.[1]

A great many theories have been advanced as to the cause for the onset of the processes included under the heading of parturition, and which occur at almost a constant period of 63 days, but

regardless of the vast amount of literature on the subject in explanation of the mystery, as yet, there is notably a dearth of factual data substantiating these ideas.

It is generally conceded that a solution[5] of the question lies in the field of endocrinology. It is of historical interest to know that Williams[1] evidently fostered such a thought about 30 years ago, long before there had been much of a study of hormones. He had observed that dislodgment of the corpus luteum produced abortion and also noticed that, normally, the corpus luteum begins to disappear late during gestation, and that at the time of birth it has become completely atrophied. He states further:

> The relation of this disappearance of the yellow body from the ovary to the expulsion of the fetus has not been studied and may be quite interesting, as it possibly exerts a highly important influence upon birth.

Investigational work has pointed out the possible rôle that the endocrines play in reproduction. The most common theory[16] is that the pituitary body, acting as a central governing organ, produces sex-stimulating hormones that interact with or influence other hormonic secretory structures of the genital organs. These processes supposedly are responsible for the various phases of reproduction. Some of the theories concerning these phenomena have experimental evidence as a foundation, while others have not.

The inhibiting influence of some substance (progestin) produced by the corpus luteum upon uterine contractions has been demonstrated experimentally upon animals by Poltman[6] and by Mandelstamm and Tschaikowsky.[7]

The popular hypothesis[8] that pituitrin, acting synergistically with estrin, has some action in overcoming the inhibiting influence of progestin at the termination of pregnancy has not been definitely proven. On the other hand, the experimental work of Smith,[9] on rats, also the work on dogs by Dott, quoted by Smith,[9] demonstrates that normal parturition can take place with the posterior lobe of the pituitary removed.

Another substance, "relaxin,"[16] derived from the corpus luteum, has been attributed with powers of bringing about relaxation of pelvic ligaments.

Just what practical application can be made out of results of investigational work in the field of endocrinology, in connection with canine obstetrics, remains to be seen.

The term "uterine inertia" is one that has been in use for a long time in the field of obstetrics and usually has been applied in a broad sense by taking the dictionary definition literally. As the expression is customarily used, it is defined as an absence, weakening, or suspension of uterine contractions. This usage of

the term would apply to widely varied morbid conditions of the uterus. A quotation on the subject by Hodge,[10] a human obstetrician, published in 1866, still holds good today:

> A deficient excitement in the muscular powers of the uterus not unfrequently complicates labor. This diminution of action may often exist where the uterine forces are still great; while in other instances, it constitutes one of the many evidences of the actual loss of power in the uterus alone, or in the general system. The former has very generally been termed a state of inertia; the latter a state of debility of exhaustion. These two conditions are very different as regards their nature, causes and treatment. They should, therefore, be carefully distinguished one from the other, both theoretically and practically.

This classification was followed by Hobday.[11] Other writers[12-14] have mentioned uterine inertia but none have given a very comprehensive description of the condition. Cuille, Darraspen and Chelle[12] have stressed the importance of the condition by furnishing statistics showing that out of 199 cases of dystocia, 169 were caused by uterine inertia.

The writer, in order to present more clearly his views and observations of abnormalities coming under the heading of uterine inertia, will compromise with customary usage of the term and classify the condition under primary and secondary inertia. This classification is not entirely original, as the expressions have been used by others. The above-mentioned French authors,[12] as well as Wright,[13] use the terms in the same sense.

The term "secondary inertia" is applied to a sequela of some debilitating or exhausting condition. Secondary inertia is associated with obstructive dystocia and as previously mentioned, it is in reality more of a condition of fatigue or exhaustion of the contractile powers of the uterine muscles.

As obstructive dystocia has been thoroughly gone into by several writers, a discussion of the same will be omitted in this paper.

Inflammatory conditions of the uterus are usually manifested by some degree of inertia. This condition is of frequent occurrence, but due to lack of time, data on its comparative frequency, collected from personal experience, are not being submitted in this paper. Bordeaux,[14] who has reported some carefully made observations, states:

> A long experience covering a great number of abdominal sections and post-mortem examinations made on pregnant bitches has shown that delayed parturition is in almost every case produced by inertia of the uterus due to a more or less advanced condition of endometritis.

This author's observations probably would vary from the experiences of others.

As to the etiology of uterine inflammations, nothing definite has been reported. The lesions noticed are usually in the horns. The area involved may be small or include an entire horn or even both. The inflammation is not always limited to the endometrium, but is occasionally to be seen involving the musculature also. The body of the uterus is not usually affected, but has been observed as the result of injuries inflicted by careless assistance in delivery. Bordeaux[14] observed that "endometritis seemed to commence as a rule in the apex of the horn." One or more dead pups are usually found. Occasionally, all are dead while, in some instances, some born alive are weak and resemble a septicemic condition.[14]

The clinical picture is quite varied. One of the cardinal symptoms of inflammation applies the same for the uterus as for any other organ, and that is there is a suspension of function.

The usual premonitory symptoms of parturition are present the same as in a normal case. Occasionally, a bitch will show some evidence of toxemia at the termination of pregnancy, or sometimes a few days prior, which is characterized by vomiting, inappetence, and some stiffness of the hind legs, as well as a rise of temperature. These symptoms might confuse the condition with nephritis, which is not uncommon at this time. There may or may not be a putrid discharge. The presence of the discharge does not bear much relation to the general condition of the animal, as some will proceed to expel the uterine contents with apparently little trouble or bad after-effects. Other cases may show feeble expulsive efforts or there may be a total absence of same. The owner, becoming alarmed, may bring the dog to the veterinarian, because her time is up and there has been little or no visible labor.

A large percentage of this type of cases proceed like a normal case. That is. the expulsive stage sets in without suspicion of anything being wrong. Even one or two pups may be expelled. Then labor becomes weak or entirely suspended for long intervals. One might be suspicious of a malpresentation or an oversized pup or that the bitch is becoming exhausted. Uusually some of the pups will be dead. The last one nearly always is. Many times the dog will need assistance on every pup if delivered by the regular route.

Primary uterine inertia implies an absence of uterine contractions without any evidence of visible pathologic conditions to account for same. Although this form of inertia does not occur so often as secondary inertia, still it occurs frequently enough to merit discussion. This disorder has been mentioned in literature

by J. Cuille and associates,[12] Wright,[13] and Campbell.[2] As these authors did not give a detailed description of the condition in their reports, this article will merely include the personal observations of the writer.

Etiology

The cause of primary uterine inertia is not definitely known, but there is some evidence to suggest that an endocrine dysfunction may be responsible. About the only experimental work that would partly substantiate this theory, and that has been reported in the literature, is that of the previously mentioned investigators, Poltman,[6] and Mandelstamm and Tschaikowsky.[7] These workers demonstrated that it is possible to prolong the period of gestation by the administration of an extract of the corpus luteum (progestin). The causative influence of predisposing factors such as the presence of large litters has not been proven. In one of the writer's cases, there was only one pup present.

The first phenomenon noticed is that a bitch in apparently good health comes to term manifesting the usual premonitory signs of parturition, excepting psychic disturbances, such as acting uneasy and making a nest. This phenomenon also has been observed by Campbell.[2] If one examines the vagina from day to day, it will be noticed that the cervical canal eventually dilates, but no expulsive efforts are observed even though one waits three or four days. This observation has caused the writer to conclude that dilatation of the cervical canal, being part of the first stage of labor in other species, does not apply to the act in bitches. On the other hand, it would appear that a separate stimulus is necessary for the initiating of uterine contractions.

This dilatation of the cervical canal may take place anywhere from the 63rd day on; in most cases it is delayed. Wright[13] reports some cases dilating from the 73rd to the 84th day.

It is only occasionally that a pup is found in the body of the uterus in this type of inertia. It has been observed on rare occasions that a dog has been presented for treatment with a history that, without any signs of getting ready to whelp, she gave birth to a pup and did not pay any attention to it but went about as if nothing had happened, and that nothing more was liable to take place. The owner, after waiting several hours, gets anxious and seeks advice. One may wait several hours longer and terminate the ordeal. Cesarean section shows a normal-appearing uterus with living pups. The only abnormality observed in some cases is a slow involution. It is possible that some of these cases were normal and surgical intervention unnecessary. Just how long these cases might go and still have live pups has

not been reported in the literature. Of course, this information would be difficult to obtain, as a practitioner usually renders assistance without waiting.

The following case of the writer is of interest in this connection: The subject was a Cocker spaniel; age, 3 years; in her second pregnancy; no history of previous illness; 78th day of pregnancy; vomiting and inappetence for a week prior. Acted toxic, almost comatose when brought to the hospital. The owner had never observed any signs of labor; temperature subnormal.

A thorough examination was not made, as her general appearance was discouraging. The owner was advised that the pups probably were dead and decomposed and that the bitch was toxic from absorption. A hysterectomy was considered as the only hope. The dog died while being prepared. At this time some movement of the abdomen was noticed. An opening was made and six live, husky pups were removed. All of the pups were located in the horns. The uterus appeared normal. The cervical canal was dilated. All vital organs were normal, from gross appearance. No attempt was made to ascertain the cause of the toxemia.

Some have observed macerated or mummified fetuses when doing a hysterectomy for relief of pyometra. In one case of the writer, the owner did not know that the bitch had ever been bred. Wright[13] reports a case that went 106 to 119 days. Hysterectomy was performed and one fetus was found in the right horn, undergoing mummification. The cervical canal was found closed.

About the only possibility of confusing primary inertia with secondary is when some inflammatory condition is present. In nearly all cases of secondary inertia, there has taken place the usual symptoms associated with beginning parturition. If observed closely, there are also expulsive efforts, even though feeble. The body of the uterus will be found to contain a pup shortly after labor begins. Also, in case of uterine paresis due to endometritis, a putrid odor is usually noticed and the animal has a toxic appearance. The chief characteristic of one affected with primary inertia is that the subject usually behaves like a normal dog and one would not be concerned over it if it was not for history of being due or past due.

Treatment

It is not within the scope of this article to include a treatise on treatment of parturition difficulties, but we will merely dis-

cuss the more salient points on treatment in connection with inertia.

Secondary inertia associated with obstructive dystocia is usually treated either by cesarean section or instrumentation, combined with oxytocic agents. The proper method for each case has to be left to the judgment of the practitioner.

Practically the same advice is applicable to inertia due to some inflammatory conditions. The use of agents to increase muscular contraction in the presence of inflammation is a questionable procedure. In some instances there seems to be enough contractile power in the uterine horns to force the fetus into the body of the uterus, but there is an inability to pass it through the pelvis, even though there is plenty of room. In such cases one should be satisfied in removing it with forceps and waiting for another pup to appear in the uterine body instead of employing oxytocic drugs to attempt to increase muscular force, because in some cases it seems to increase the paretic condition. In those conditions where the paresis seems quite pronounced, or if there is little or no response to ecbolics and there appear to be several fetuses present, it would probably be better to proceed with a hysterectomy while the bitch is a fair surgical risk.

It must be remembered that there are points to be considered other than the strictly medical aspects. A decision may depend partly on the motive of the owner for the dog being pregnant. Some do not care anything about the life of the pups, nor the future breeding usefulness of the bitch. This is especially true of the owner of an individual dog, who has it primarily as a pet. The attitude of the owner of several would be the opposite, as it is a business with him. If the case should be for an owner who is chiefly concerned with the life of the mother and only one or two pups are present, the use of instruments is probably the best course to adopt, even though the young are sacrificed.

In this type of inertia, as a general rule, wherein living pups are the main objective of the owner, more satisfactory results will be obtained by cesarean section than by any other method. Most operators have improved their technic for this operation to the point where it is no longer considered particularly hazardous, and by many is their first line of treatment, instead of their last.

As has been explained, the cause of primary uterine inertia is a lack of some necessary stimuli, possibly of endocrine origin, to initiate uterine contractions. The kind of treatment is usually along lines to furnish this stimulation. Therapy for this purpose has been either mechanical or medicinal, or both.

The mechanical methods usually consist of irritation of the cervical canal[2] with the forefinger, or attempting to grasp a fetus with a long forcep.[11] Also douches, such as glycerin (1 to 10 solution).[3] Sometimes results may be obtained by these methods, but they have not proven very satisfactory with the writer.

The medicinal agents that have been used for this purpose to some extent are ergot and some of its derivatives, quinine sulfate and pituitrin. The first two preparations probably were tried as oxytocics for dogs, because of the popularity they sometimes receive in the field of human obstetrics,[15] but experience[12] with their use in canine practice has not been very favorable.

Pituitrin, an extract of the posterior pituitary body, as an oxytocic, has given the most satisfaction. Of course, there have been unfavorable reports, but this is to be expected when one considers that it is commonly used in all cases of delayed parturition, regardless of cause. As a whole, the preparation is of doubtful value in many cases of secondary inertia, but in the experience of the writer, it has been consistently specific in primary inertia.

In using pituitrin, in primary inertia, it seems best to wait 24 hours after the beginning of dilatation of the cervical canal before administering it. If there is no response within an hour, repeat with a double dose. Usually action is obtained within 30 minutes; that is, expulsive efforts begin and parturition proceeds as in a normal case. Seldom is it necessary to repeat the dose after the process is once initiated.

It is quite probable that many of these cases are relieved by hysterectomy, to which there can be no serious objection, even though unscientific, as they are usually good surgical risks.

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A Veterinary Demonstration

At the recent meeting of the American Veterinary Medical Association, Dr. E. A. Rodier of Washington related his experience in establishing a bureau of animal welfare in Kwangsi province, southwestern China, a territory of 220,000 square miles inhabited by 13,000,000 people, 2,300,000 large animals, 10,000,000 hogs, 18,000,000 chickens and 7,000,000 ducks. One area of this province was selected for a demonstration, an area which had always suffered heavy losses by animal disease. About 30 per cent of the 50,000 cattle and buffalo in this area were destroyed by rinderpest every year. The veterinarians were able to reduce this loss to practically nothing and to reduce other losses, but they did not stop there. They demonstrated the value of better breeding and the methods by which feed might be produced in abundance. In all of which the people coöperate. Such an example as this gives us some idea of what the losses of our live stock industry might be if it were without the service of veterinary medicine. Thirty per cent loss by rinderpest, which long ago ceased to trouble regions with veterinary service, seems almost incredible, yet it might be possible here and now in an epidemic of hog cholera if we were without the protection of veterinary service. And we might cite other examples. When we are irked by what seems to be unnecessary restrictions, maybe we should try to understand what our animal industry would be without such protection as veterinary science gives it. —*Pennsylvania Farmer.*

India Rubber Belt

In spite of the continuous efforts of chemists over a period of many years, no satisfactory method of producing rubber snythetically has been evolved. The United States is obliged to import practically all of the rubber used in manufacturing rubber products. The chief source of rubber for commercial purposes is the East Indies, in the region known as the "India Rubber Belt." Brazil produces only a small part of the rubber now used in industry.

VACCINATION AGAINST BANG'S DISEASE IN AN INFECTED DAIRY HERD WITH UNITED STATES BUREAU OF ANIMAL INDUSTRY BRUCELLA ABORTUS STRAIN 19*

By C. M. HARING, *Berkeley, Calif.*
University of California

The results obtained by Cotton, Buck and Smith,[1] of the United States Bureau of Animal Industry, in immunizing young heifers to Brucella infection by the use of living vaccines made from *Brucella abortus* cultures of moderate virulence, indicate that at least one of the strains with which they experimented, and which they have designated as strain 19, may be suitable for veterinarians to use on young heifers in certain infected herds. Recently, Haring and Traum[2] published a study of the pathogenic and antigenic effects of this strain on animals vaccinated experimentally. In general their conclusions supported those of Cotton, Buck and Smith.

The principal purpose of this paper is to report some effects of the use of strain 19 in a dairy herd belonging to a California state institution. In 1933, attention was attracted to the existence of Brucella infection in this herd by the development of undulant fever in several of the officials and inmates of the institution. The herd had been tested by the State Division of Animal Industry, in 1931, and 20 of the 50 cows in the herd at that time had shown a blood-serum agglutination titre of 1:100 or more, but no action was taken to eliminate the infected animals.

During the summer of 1933, when some of the human cases of brucellosis were occurring, the milking herd consisted of 43 grade Holstein-Friesian cows, of which 19 showed a blood-serum agglutination titre of 1:100 or over, two had titres between 1:25 and 1:50, and 22 were classed as negative. In addition to the cows there were two bulls, two bred heifers, 17 open heifers ranging up to 28 months of age, and eight younger calves. All of these additional animals were negative to the agglutination test, with the exception of heifer 65, which had a titre of complete agglutination in the 1:50 tube, and incomplete agglutination in the 1:100 tube.

*Presented at the seventh-fourth annual meeting of the American Veterinary Medical Association, Omaha, Neb., August 16-20, 1937. This study was supported in part by grants from the United States Bureau of Animal Industry. Acknowledgment is made to Mrs. Phyllis A. Zweigart, agent, U. S. Bureau of Animal Industry, for the bacteriologic procedures in this work. The Works Progress Administration furnished caretakers for the small animals, and some laboratory help.

Repeated culture tests and guinea pig inoculations from all the cows in the herd showed 13 of them to be shedding *Br. abortus* in the milk during 1933. The cultures isolated from each of these 13 cows proved to be typical *Br. abortus* Bang. This was done before any vaccine was used in the herd. With the exception of three additional young bulls, no outside cattle have been brought into this herd in the past seven years. There is little possibility of contact with outside cattle, since there is none in the vicinity. The officer in charge of the institution preferred to retain a number of the shedders because they were efficient milk-producers, and it was therefore decided to install a pasteurizer and attempt to reduce the disease by systematic vaccination of calves and open heifers, without removing the older infected cows until they became unprofitable as milk-producers.

Vaccine was prepared from transplants of strain 19 in accordance with directions from the Bureau of Animal Industry, and plate counts indicated a content of living *Br. abortus* averaging approximately ten billion organisms per cc. The dose administered was 20 cc, except that one heifer received 30 cc by mistake, and seven others received 10 cc.

In the fall of 1933, vaccine was administered to all of the 24 nonpregnant heifers in the herd. These ranged in age from seven to 30 months at the time of vaccination. During 1934, 1935, 1936, and to July, 1937, the number of calves and heifers vaccinated each year was 19, 9, 20, and 21, respectively. These were vaccinated at ages ranging from four to 13 months. The total number of vaccinations to date is 93. As an experiment, twelve of the youngest heifers were revaccinated after an interval of ten to twelve months; and the vaccine was also injected into three first-calf heifers soon after calving, and into four older cows, in order to add to data available from other herds where the vaccination of adult cows had been tried.

Immediate Effects of the Vaccination

Haring and Traum[2] have shown by investigations in another herd that the organisms of strain 19 may remain alive at the point of injection at least 24 days, and in the circulating blood for about three weeks. Apparently, in animals vaccinated as unbred heifers, the vaccine usually causes a rise in temperature which begins between the eighth and 36th hours, and remains above 104° F. for three days or more. The highest temperature observed by the writer was 106.2° F. The temperatures are usually highest between 24 and 72 hours following vaccination.

While carrying high temperatures as a result of the vaccination, heifers may exhibit anorexia and malaise. In mature animals the shock of vaccination is apparently greater and more lasting than in calves. In lactating cows there is often a sharp reduction in milk-flow immediately after vaccination, and recovery to full production may require as much as two weeks. The chart in figure 1 shows the drop in milk-production which followed the injection of vaccine into a nonpregnant ten-year-old cow which had calved 130 days previously.

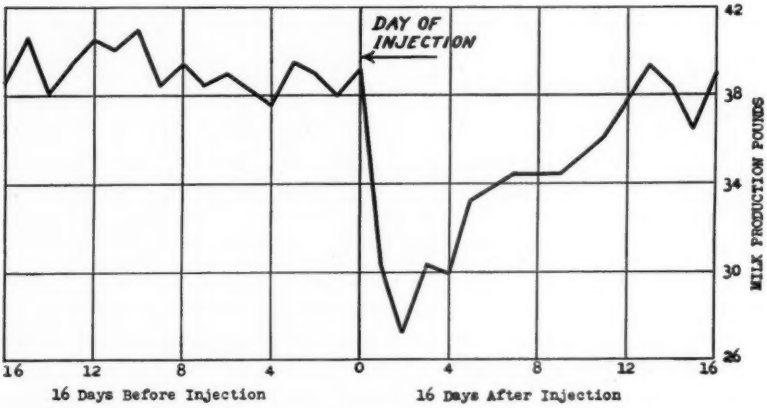

FIG. 1. Chart showing fluctuation in milk production of a nonpregnant aged cow following injection of a 200-billion dose of *Brucella abortus* strain 19 on the 130th day of lactation.

THE ASSOCIATION OF VACCINATED AND NONVACCINATED CATTLE

No effort was made to keep the vaccinated animals separate from the nonvaccinated. The recently vaccinated heifers were not kept in the same pastures or corrals as the milking herd, but at most times a few nonvaccinated negative animals, including some pregnant cows, were kept with them. During the past four years, frequent agglutination tests have been made of the entire herd, but no evidence has been obtained to indicate that any transmission of infection with strain 19 has occurred between the vaccinated and nonvaccinated animals. This is in accordance with observations published by Haring and Traum,[2] who, for 3½ years, kept a group of young vaccinated cattle with approximately an equal number of nonvaccinated controls of the same age and also several nonvaccinated cows, without any evident transfer of infection by strain 19.

The Effect of Strain 19 on Pregnant Animals

Cotton[3] and Buck[4] have both advised against the vaccination of pregnant cows by stating that they should never receive abortion vaccine of the kind prepared at present, since it would be likely to transmit the disease to them rather than act as a preventive. In spite of this, some veterinary practitioners venture to use strain 19 on all animals in certain badly infected herds, regardless of the condition of pregnancy. At least one of the commercial firms manufacturing the vaccine has advocated such practice in its advertising literature.

In trials on animals segregated at the University of California, it has been shown that if strain 19 is injected subcutaneously into cows during advanced pregnancy, it may produce typical brucellosis with transient bacteremia, and also exudative and necrotic placentitis with discharge of large numbers of the organisms in uterine material at the time of parturition. The writer has observed, however, that in several cases the vaccination of pregnant heifers previous to the fifth month of pregnancy was not followed by any apparently had effects.

The vaccination of heifers in the early stages of gestation may happen even when the veterinarian has no intention of vaccinating pregnant animals. This occurred in the particular herd under discussion. Eleven supposedly unbred heifers, ranging from nine to 13 months of age, were submitted by the herdsman for vaccination. Later, it was discovered that three of them had been in gestation 88, 122 and 132 days, respectively, when they were vaccinated. All three of the animals completed full-term gestations, and no evidence of brucellosis was found. The cultures and guinea pigs inoculated with their colostrum and uterine material were all negative from *Br. abortus*.

A Comparison of the Vaccinated and Nonvaccinated Groups

It should be kept in mind that the unvaccinated cows in this herd are old animals, all of which were in the milking string at the time vaccination was started in 1933, and that the vaccinated cows now mixed with the old cows in the milking herd have all come into production since that time. None of the vaccinated cows have been in production more than three years.

No evidence of the shedding of strain 19 by these cows has been obtained, although tests have been made of the colostrum and uterine material at each calving of a vaccinated animal, and in addition the entire herd has been tested at least once a year by inoculating one or two guinea pigs with cream-and-milk sediment from each cow.

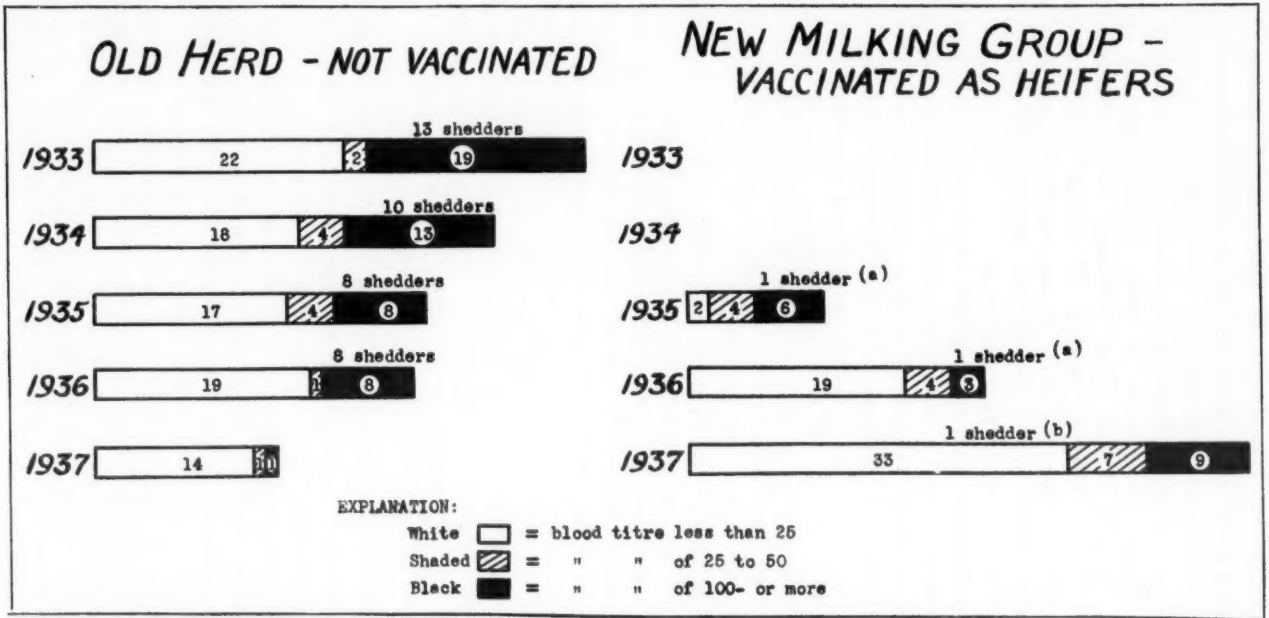

FIG. 2. Chart showing relative size of nonvaccinated and vaccinated milking groups during July of each year, classified according to the blood-serum agglutination test, and number of cows shedding *Brucella abortus*.

(a) The vaccinated cow 65, which shed *Br. abortus* in 1935 and again in 1936, had a titre of 1:100 when vaccinated in the year 1933, at the age of 25 months.

(b) In February, 1937, heifer 94, with negative blood and whey titres, yielded *Br. abortus* of virulent type (not strain 19) in a vaginal swab at the time of her first calving.

The chart in figure 2 shows that the total number of cattle in the milking herd increased from 43, in 1933, to 65, in 1937. This increase was the result of the coming into lactation of 49 vaccinated heifers which more than counterbalanced the removal of 27 of the old cows. Previous to 1937, infection with *Br. abortus* was not by itself deemed sufficient cause for discarding animals. Early this year, brucellosis spread to one of the old nonvaccinated cows, and it was therefore decided to remove seven of the shedder cows and leave in the herd just one high-titre reactor from the nonvaccinated group because she was a very good milk-producer. It was thought that continued observation of this cow might furnish useful information.

A summary of the parturition data available from the herd during the past four years is shown in table I, from which it may be seen that 198 parturitions have occurred. Of these, 108 were in the nonvaccinated group, and 90 were in the vaccinated group. Except for seven abortions and one premature calving, all of the old nonvaccinated cows gave birth to full-term vigorous calves. In the vaccinated group there have been 82 apparently normal calvings, four full-term stillbirths and four abortions. The stillbirths are attributed to dystokia, and the causes of the abortions are unknown, but no evidence of Brucella infection

TABLE I—*Types of parturitions with reference to condition of calves at birth and existence of Brucella abortus in uterine material and milk.*

Type of Parturition	Old Herd, Not Vaccinated*			New Milking Group, Vaccinated as Heifers†		
	Parturitions	Br. Abortus		Parturitions	Br. Abortus	
		In Uterus	In Milk		In Uterus	In Milk
Full term, living calf	100	1	27	82	1	2‡
Full term, stillbirth	—	—	—	4	—	—
Premature, living calf	1	1	1	—	—	—
Abortion of dead fetus	7	1	2	4	—	—
Totals	108	3	30	90	1	2‡

*In July, 1933, there were 43 cows in this group, but on July 31, 1937, only 16 remained.

†The first of these calved on September 18, 1934. By July 31, 1937, 49 had calved one or more times.

‡The figures "2" in the right-hand column indicate that cow 65 shed *Br. abortus* in the milk at two lactation periods. See page 58.

was obtained in the stillbirth or abortion cases occurring in this group of young cows although in each case the uterine material and colostrum was inoculated into guinea pigs.

Two Vaccinated Heifers That Shed Brucella

Two heifers (65 and 94) in the vaccinated group are noteworthy because they are the only vaccinated animals that were proved to shed *Br. abortus*. The type of organism was identical with that isolated from the old nonvaccinated cattle. It did not resemble strain 19.

Cow 65, Holstein-Friesian, born Sept. 8, 1931. The dam and sire both had negative agglutination titres. The calf was reared in contact with cows infected with *Br. abortus*. Agglutination tests of blood-serum at the respective ages of 20, 21, 22, and 24 months, fluctuated between 1:50 and 1:100. When two years of age, she was vaccinated with 200 billion organisms of strain 19, after which her blood-serum titre has fluctuated between 1:100 and 1:400 for four years. On Jan. 1, 1936, she was revaccinated, the dose being 200 billion. A blood-serum agglutination test was made three months after the revaccination and showed a titre of 1:200, at which point it has continued to remain with only slight fluctuations. The titre of her colostral whey has been high. At the last calving, the whey agglutination was complete at 1:800 and partial up to 1:6,400. A few weeks after the disappearance of colostral bodies, the whey titre dropped to incomplete at 1:25. This cow gave birth to vigorous calves on Oct. 28, 1934, Nov. 7, 1935, and Dec. 21, 1936. The respective periods of gestation were 281, 279, and 283 days. No tests for *Br. abortus* were made at the first calving, but guinea pigs inoculated with uterine material at the last two calvings were negative. Tests of the milk during the first two lactating periods were repeatedly positive for *Br. abortus* of virulent type (not strain 19). Tests made of colostrum and repeated tests on the milk since the third calving have been negative for *Br. abortus*.

The possibility that cow 65 became infected before her first pregnancy, as indicated by her blood titre at the time of vaccination, and the fact that she continued to shed *Br. abortus* during her first and second lactation periods, makes her case noteworthy. At the suggestion of certain veterinary practitioners, the writer revaccinated this cow 85 days after her second calving in order to determine if the shock of revaccination would clear up her shedder condition. Thirty-nine days later, she was bred and conceived. Tests of her milk were positive for *Br. abortus* four

months after her second vaccination, but since then no discharge of *Br. abortus* has been detected.

Cow 94, Holstein-Friesian, born May 5, 1934. The dam and sire both had negative agglutination titres. The calf was reared in contact with cows infected with *Br. abortus*. At the age of 4 months, she was injected with a 200-billion dose of strain 19. No agglutinins were found in the blood-serum on the day of vaccination, and an agglutination test two months later was also negative. Repeated tests to date (July, 1937) have all been negative for agglutinins. On Feb. 4, 1937, she produced a vigorous calf after 278 days of gestation. A vaginal swab taken that day yielded *Br. abortus* of a type virulent for guinea pigs (not strain 19). Tests of the colostrum, and also of the milk drawn four months later, were negative for *Br. abortus*.

The case of cow 94 is noteworthy because of the finding of a virulent type of *Br. abortus* in her vagina at the time she produced a vigorous full-term calf, combined with the continued absence of agglutinins in the blood-serum or whey. Whether vaccination with strain 19 when the heifer was only four months of age had anything to do with this unusual syndrome can be only a matter of conjecture. It would seem desirable to investigate the possibility that calfhood vaccination may be conducive in cattle to a tolerance for virulent *Br. abortus*.

SUMMARY

Vaccine prepared from strain 19 was used in doses of 100 to 300 billion living organisms on 93 heifers in a dairy herd affected with brucellosis. For a period of four years, the results have been apparently beneficial in retarding the spread of the disease. The association of vaccinated with healthy nonvaccinated cattle did not result in any spread of strain 19 to the latter. The vaccine was also used on four cows, and caused a pronounced but temporary drop in milk production. No apparent injury resulted from the vaccination of three heifers while between the third and fifth months of gestation. Vaccination during advanced pregnancy of a cow kept in isolation brought about a typical brucellosis, with death of the fetus, and discharge of large numbers of the organisms of strain 19 in uterine material at the time of parturition.

At the time vaccinations were started, the herd contained 43 milking cows, 13 of which proved to be shedding virulent *Br. abortus* in the milk. Because they were efficient milk-producers these cows were permitted to remain in the herd. Three years

later, seven of the original 13 shedders were still in the herd, all of them continuing to discharge the organism in the milk. All but one of this group of shedders were removed recently.

At present the herd consists of 65 milking cows, 49 of which have been vaccinated as calves or heifers. Only ten cows in the herd now have an agglutination titre of 1:100 or above. Nine of these are young vaccinated cows. The tenth is the old nonvaccinated cow mentioned above as being retained when other shedders were discarded, and if she is found to be still harboring *Br. abortus*, she will serve to continue this exposure trial of testing the resistance to Brucella infection conferred by the vaccination of heifers with strain 19.

As a result of association with the old infected nonvaccinated cattle, one of the vaccinated heifers shed virulent *Br. abortus* (not strain 19) in the uterine material at the time of her first calving. She gave birth to a full-term, vigorous calf, and her agglutination titre remained negative. Another heifer, apparently as a result of infection previous to her vaccination at the age of two years, has shed virulent *Br. abortus* (not strain 19) in the milk after each of three normal parturitions in which she produced vigorous calves.

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[3]Cotton, W. E.: New researches and developments on contagious abortion (Bang's disease). Proc. 12th Internat'l Vet. Cong., 1934, pp. 283-297 (Washington, D. C., 1935).

[4]Buck, J. M.: Bang's disease (infectious abortion). U. S. Dept. Agr. Farmers' Bul. 1704, p. 17.

DISCUSSION

DR. B. A. BEACH: If I understood you correctly, you vaccinated a few of the older cows. Did you notice a tendency for udder infection of those vaccinated cows, or did you not make any observations on it?

DR. HARING: Four cows in this particular herd were vaccinated. Guinea-pig tests on the milk failed to reveal any shedder condition. One of the cows showed a mastitis due to *Streptococcus agalactiae*. We had no reason to think the vaccination produced this. Vaccination of lactating cows produces a drop in the milk for about two weeks. They will average from ten to twenty per cent of the milk the cows give normally. For that reason, some of our practitioners are vaccinating cows at the time they calve or when they are expecting to calve, so that they avoid that drop. It is not a procedure which I personally consider at all desirable. I am simply telling you what some of our practitioners are doing.

Presence of mind and courage in distress, are more than armies to procure success.

—*Dryden.*

STUDIES ON ERYSIPELOTHRIX RHUSIOPATHIAE WITH SPECIAL REFERENCE TO SMOOTH AND ROUGH TYPE CULTURES*

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In a previous paper[1] dealing with serological studies of swine erysipelas, it was pointed out that the causative agent of swine erysipelas, ***Erysipelothrix rhusiopathiae,*** produces two types of colonies, smooth and rough, and that for the preparation of satisfactory antigens for the agglutination test, the use of smooth-type cultures was necessary. For some months, using a smooth-type culture, a number of satisfactory antigens were prepared. However, at a later date, certain lots of antigens developed a tendency to become quite sensitive and on plating of the stock culture from which these antigens were prepared it was found that a large proportion of the colonies that developed were of the rough type. Since the antigen production stock culture R-7 had been derived from a single smooth colony, it was apparent that there had been a change of the type of colony formation from the smooth to the rough, even though the culture was handled in a manner that was believed to preserve its smooth characteristics. Study was therefore again undertaken to determine the factors responsible for the change of colony formation from smooth to rough and vice versa, their comparative pathogenicity, and immunizing properties.

For studying the colony formation of *E. rhusiopathiae,* the colonies must be well separated to permit maximum growth, and either plain agar or agar to which 10 per cent serum has been added is a suitable medium. Daily examinations should be made over a period of 7 days, since the maximum changes are not observed until that time. Colonies should be examined under magnification of 60X on a wide-field microscope or the low-power objective 100X on a compound microscope. The typical smooth colony of *E. rhusiopathiae* is circular, with a sharply defined, regular outline, and exhibits granular inclusions which are also of rather regular outline. The entire colony is smooth and well raised, with a convex surface, the convexity being more pro-

*Presented at the seventy-fourth annual meeting of the American Veterinary Medical Association, Omaha, Neb., August 16-20, 1937.

nounced over the central area (fig. 1). The typical rough colony of *E. rhusiopathiae* is quite irregular in outline and is flat, especially as the margins are approached. It is coarsely granular on the surface and presents in the center a coarsely granular, dense area that is raised and has a convex surface and the granules appear to have exploded into irregularly pointed masses of varying sizes (fig. 2). Intermediate types have been noted

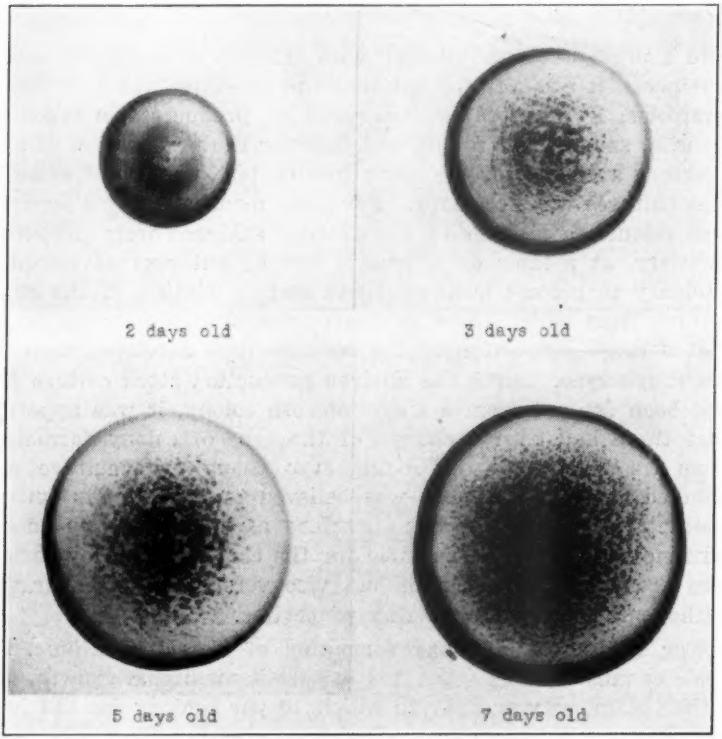

Fig. 1. Smooth colony of *Erysipelothrix rhusiopathiae*, strain R-7.

and these (R-S types) exhibit some of the characteristics of both rough and smooth colonies and are seen in quite a variety of formations.

On primary isolation of the erysipelas organism from the animal body, it has been our experience that the smooth type of colony is found most frequently. An interesting exception was encountered in one case of an adult boar that clinically was affected with the chronic, arthritic form of swine erysipelas.

From two joints of this animal, typical smooth cultures were obtained, while from a third joint, typical rough cultures were obtained. Later, after cultivation on artificial media, this rough culture changed to a smooth type, with a consequent change in its pathogenicity, which will be mentioned later.

In our examination of old stock cultures for colony types, rough colonies were encountered almost exclusively. Ocasionally a smooth colony was observed. In those old stock cultures which

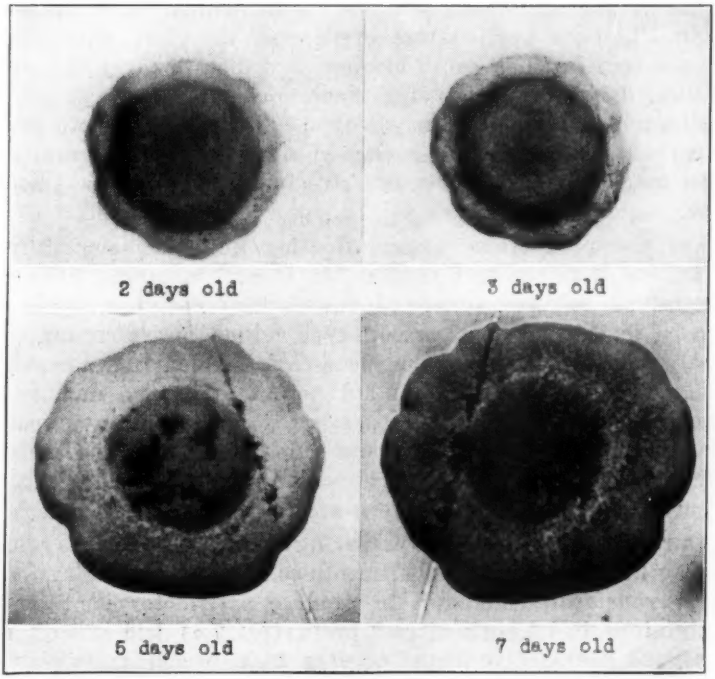

Fig. 2. Rough colony of *Erysipelothrix rhusiopathiae*, strain R-7.

we have examined, approximately several hundred rough colonies were found to one smooth colony. In limited observations it appeared that the type of medium used for the cultivation of the swine erysipelas organism is the most important factor influencing the colony type formation. The solid media are conducive to development of rough colonies and the liquid media favor the development of smooth-type colonies. The pH of the media seems to be another factor, since smooth-colony cultures maintained in a medium under pH 7.2 show signs of becoming rough.

High pH media (7.8) also seem to cause some roughness in colony formation.

The time interval between transferring or subculturing of the organism also seems to be a factor influencing the colony type formation; the greater the time interval between transfers, the greater the tendency of the organisms towards roughness. The changes that had taken place in the antigen production stock culture R-7, which had been derived from a smooth colony, indicated that the smooth culture could not be held for any great length of time in the smooth state on the ordinary beef infusion broth. Leibig's beef extract broth was, therefore, substituted for the beef infusion broth medium on which to carry the stock culture, daily transfers being made. This medium apparently has been able to hold the smooth-type culture in its smooth form. A period of five months has elapsed since the extract broth has been used and the cultures are still found to be of the smooth type.

For the production of agglutinating fluid, the smooth-type organisms give the best results. In several instances, however, rough-type cultures furnished satisfactory antigens, while in several instances typical smooth-type cultures were encountered that consistently produced antigens that were entirely too sensitive. For the production of antigens, therefore, a number of smooth-type colonies should be selected and antigens prepared from several, their specificity and sensitivity tested and the one performing in a satisfactory manner selected as the stock culture from which subsequent antigens are to be prepared.

Our present method of preparing swine erysipelas agglutinating fluid is as follows: A smooth-colony culture of *Erysipelothrix rhusiopathiae* known to produce satisfactory antigen is maintained in Liebig's extract broth (pH 7.4) and subcultured every 24 hours. Five-tenths cc of a 24-hour culture is planted into flasks of standard beef infusion broth (pH 7.4) and incubated at 37° C. for 24 hours. One per cent formalin is then added and flasks are again incubated at 37° C. for an additional 24 hours. Tests have shown that this formolization and incubation kills the organism. The organisms are collected by passing the formolized culture through a super-centrifuge having a speed of 30,000 r.p.m. The sedimented organisms are then suspended in physiological saline solution to which 1 per cent formalin has been added and they are then resedimented in a cup-centrifuge. The supernatant fluid is drawn off and the organisms are taken up with a small amount of 1 per cent formalin saline solution

and shaken in a shaking-machine for one-half hour. Small rubber beads are used to facilitate breaking up the packed organisms. The heavy suspension is filtered through a thin layer of cotton in a Buchner funnel and the cotton filter is washed clear of organisms with a small amount of the diluent. The density is adjusted to 50 times No. 1 McFarland scale for the rapid plate antigen, and two times No. 1 McFarland scale for the tube antigen. The final product is tested for sensitivity immediately after preparation and after several weeks storage at room temperature. Up to the present time, antigens prepared according to this method have been found to be quite satisfactory, some after months preparation.

TABLE I—*Tests for virulence of smooth and rough cultures of erysipelothrix for mice. (0.2 cc subcutaneously in all cases).*

MOUSE	TYPE OF CULTURE	DATE OF INOCULATION	POST-INOCULATION OBSERVATIONS								REMARKS
			5-2	5-3	5-4	5-5	5-6	5-7	5-8	5-9	
1	Smooth (R-7)	5-1-35		D							Positive
2				D							Positive
3					D						Positive
4					D						Positive
5	Rough (R-7)		OK	OK	OK	OK	OK	OK	OK	OK	R. 5-11-35
6			OK	OK	OK	OK	OK	OK	OK	OK	R. 5-11-35
7			OK	OK	OK	OK	OK	OK	OK	OK	R. 5-11-35
8			OK	OK	OK	OK	OK	OK	OK	OK	R. 5-11-35
			5-11	5-12	5-13	5-14	5-15	5-16	5-17	5-18	
9	Smooth (R-7)	5-10-35			D						Positive
10						D					Positive
11							D				Positive
12	Rough (R-7)		OK	OK	OK	OK	OK	OK	OK	OK	R. 5-20-35
13			OK	OK	OK	OK	OK	OK	OK	OK	R. 5-20-35
14			OK	OK	OK	OK	OK	OK	OK	OK	R. 5-20-35
			7-14	7-15	7-16	7-17	7-18	7-19	7-20	7-21	
15	Smooth (R-7)	7-13-35				D					Positive
16									D		Positive
17										D	Positive
18	Rough (R-7)		OK	OK	OK	OK	OK	OK	OK	OK	R. 5-22-35
19			OK	OK	OK	OK	OK	OK	OK	OK	R. 5-22-35
20			OK	OK	OK	OK	OK	OK	OK	OK	R. 5-22-35

Positive = Swine erysipelas organisms recovered from blood after death.
R = Released.

PATHOGENICITY OF ROUGH, SMOOTH AND INTERMEDIATE TYPES

Experiments on mice have shown that the smooth culture is consistently virulent, whereas the rough culture has been found to be regularly avirulent. The previously mentioned rough culture isolated from the joint of a boar was found to be avirulent, but on later cultivation this organism changed to the smooth type and was then pathogenic for mice (table I). Inoculations of these cultures into swine have been limited. Three pigs, 4½ months old, were inoculated in one test. One received the smooth culture, one the rough culture, and the third a mixture of the rough and smooth in amounts of 15 cc intraperitoneally. These injections were without effect. In a second test, three pigs, 4 months old, were inoculated with 24-hour broth culture of the smooth organism. One received 100 cc intraperitoneally, the second 80 cc subcutaneously, and the third 15 cc intracutaneously, without producing any definite evidence of the disease.

TABLE II—*Tests of immunizing value of rough cultures (24-hour broth) of Erysipelothrix rhusiopathiae (R-7) using mice as test animals. (Immunized, February 6, 1937; exposed, February 26, 1937.) Exposure virus, 0.2 cc of 24-hour broth culture of E. rhusiopathiae R-7 regular.*

MOUSE	IMMUNIZING DOSE AND METHOD	RESULTS
1	0.2 cc Subcutaneously	Remained well. R. 3-24-37
2		Remained well. R. 3-24-37
3		Remained well. R. 3-24-37
4	0.2 cc Intraperitoneally	Remained well. R. 3-24-37
5		Remained well. R. 3-24-37
6		Remained well. R. 3-24-37
7	0.5 cc Subcutaneously	Remained well. R. 3-24-37
8		Remained well. R. 3-24-37
9		Remained well. R. 3-24-37
10	0.5 cc Intraperitoneally	Remained well. R. 3-24-37
11		Remained well. R. 3-24-37
12		D. 2-20-37. Neg. swine erysipelas
13	Controls	D. 3-2-37
14		D. 3-2-37
15		D. 3-3-37
16		D. 3-3-37
17		D. 3-3-37
18		Sick 3-8-37

R = Released.
D = Dead.

Immunity in Mice Upon Injection of Rough-Type Culture

Although rough cultures of the swine erysipelas organism can be injected into mice without causing infection, such injections in our experience have been observed to produce regularly in mice a solid immunity to subsequent injections of virulent cultures (table II).

Summary

1. *Erysipelothrix rhusiopathiae* produces two types of colonies, smooth and rough.

2. Cultures on primary isolation are principally smooth-type colonies. Old stock cultures are almost entirely rough-type colonies.

3. Factors influencing change in colony formation are type of media, pH of media, and time interval between transfers.

4. Smooth cultures are the most satisfactory for the production of agglutinating fluid. A method for the preparation of agglutinating fluids is given.

5. Smooth cultures are regularly virulent for mice and pigeons, while rough cultures are avirulent. In limited tests on swine, however, smooth cultures failed to infect.

6. Rough cultures, while avirulent for laboratory animals, produce immunity to subsequent inoculation with smooth virulent cultures.

Reference

[1]Schoening, H. W., and Creech, G. T.: Swine erysipelas—with particular reference to serological diagnosis. Jour. A. V. M. A., lxxxviii (1936), n. s. 41 (3), pp. 310-316.

Discussion

Dr. F. A. Humphreys: Does either a low pH or a high pH tend to produce rough cultures?

Dr. Schoening: Above 7.4 the tendency is for the colonies to become rough.

Dr. Frank Thorp: Have you observed any rough cultures coming out from your smooth?

Dr. Schoening: Yes, we have observed that. There is an intermediate type, which has more the characteristics of the smooth than of the rough, and others will look like a rough coming out of a smooth. It is a half and half proposition.

American Dog Wins in England

For the first time, an American dog won first honors in the recent English Kennel Club show, when Ch. Shelterock Merry Sovereign, an Airedale, was judged best of show. The winner was owned and bred by S. M. Stewart, of Montclair, N. J.

AN INVESTIGATION OF SEVERE LOSSES FROM ABORTION IN EWES*

By A. M. LEE *and* L. H. SCRIVNER
University of Wyoming, Laramie, Wyo.

Abortion in sheep, while not uncommon, has never been of great economic importance compared to abortion in cattle. Much of it has been due to faulty handling and other phases of mismanagement and it was at first thought that the trouble being reported in this article was due to such a cause.

LITERATURE

Infectious abortion of ewes due to a definite microörganism has been reported several times by various investigators. These outbreaks have been of an enzoötic nature and have caused heavy losses to sheepmen. In most of these troubles the etiological agent was found to be a vibrio. M'Fadyean and Stockman,[1] in 1913, and, later, Stockman[2] were the first to report a vibrio as the cause of abortion in sheep. Carpenter[3] reported abortion in a band of ewes in New York from which a vibrio was isolated in 1918. Investigations on abortion in sheep in the western part of the United States were made by Welch and Marsh[4] in 1924. They found a vibrio to be the cause. Graham and Thorp[5] reported upon vibrionic abortion in sheep in Illinois in 1929.

It will be noted that all the references cited above dealt with a vibrio as the specific causative factor. Only two references have been found which attribute infectious abortion in sheep to definite microörganisms other than the vibrio. One of these, by Bruce,[6] rather definitely incriminates *Brucella abortus* as the cause of the condition investigated in Canada. The other, by Howarth,[7] proves a *B. coli*-like organism as causing abortion in sheep in California.

HISTORY OF THE TROUBLE

A sheepman of Big Horn County, Wyoming, started having trouble from abortion in ewes in the early spring of 1937. He had 1,050 ewes with lamb. Beginning February 20, he had from one to 15 ewes abort daily, until a total of approximately 500 ewes had aborted, 20 of which died. The bucks had been turned in on November 19 and had been taken out on January 3. Some of the aborted lambs were about two months along and some would have been due in two or three weeks. The latter would

*Presented at the seventy-fourth annual meeting of the American Veterinary Medical Association, Omaha, Neb., August 16-20, 1937. Published by permission of the Director, Wyoming Agricultural Experiment Station.

live a few minutes after being dropped. After the trouble first started, the owner changed bed grounds, opened different stacks and changed herder. The ewes were being watered in the Big Horn River, where many other sheepmen were watering and having no trouble.

Experimental Work

The specimens obtained and upon which experimental work was done consisted of aborted lambs, fetal membranes, vaginal discharges of aborting ewes, and blood of aborting eyes. Agglutination tests were run with the blood of the ewes, using *Br. abortus* as the antigen. The tests gave negative results in the 1:25 dilution and higher. Bruce[6] found the serum of aborting ewes would agglutinate *Br. abortus* in dilutions sometimes as high as 1:5,000 when this organism was the cause of the trouble.

Microscopical examination of smears from the various specimens failed to show the presence of a vibrio but large numbers of short, Gram-negative rods, sometimes crescent-shaped, were seen. Blood-serum agar and cooked-meat media were inoculated for both aerobic and anaerobic growth. One organism was consistently found in the field material and was later isolated in pure culture.

Effect of the Organism on Pregnant Ewes

Four pregnant ewes were given the organism intravenously. They aborted in 3, 9, 13 and 25 days, respectively. The organism was isolated in pure culture from the aborted lambs. Another pregnant ewe was drenched with some of the vaginal discharge from one of the ewes that had aborted on the range. This ewe so drenched also aborted in 21 days and the organism was again isolated from the fetal membranes and fetus. The pure culture was placed in the vagina of two pregnant ewes. Neither of them aborted. The vaginal discharge which caused abortion as a drench was placed in the vagina of a pregnant ewe. The ewe did not abort. The pure culture was given orally to two pregnant ewes. Neither aborted, but one of them lambed a live lamb and a dead lamb 20 days later. The organism was isolated from the dead lamb.

The ewes which had aborted were bled and their sera were tested by the agglutination test, using the organism as an antigen. One ewe's serum agglutinated this organism four days after the abortion, giving complete agglutination in the 1:80 dilution and incomplete at 1:160.

Fifteen days later, the titre had dropped to 1:40. The serum of none of the other ewes showed any agglutinability for the organism which had produced the abortion.

Because of the time of the season it was impossible to obtain more pregnant ewes.

MORPHOLOGY AND STAINING

The organism is a rod occurring singly, in pairs and occasionally in short chains. It is about 0.5 to 0.8 micron in diameter and from 1 to 3 microns in length. A few of the rods are slightly curved. When stained lightly with carbol fuchsin, the internal structure is quite striking. A few individuals show bipolar staining. Others show a heavily staining, crescent-shaped structure around one side, including the ends, the other side remaining very lightly stained. Others stain evenly. The organism is non-motile and does not produce spores or capsules. It stains well with the ordinary stains and is Gram-negative.

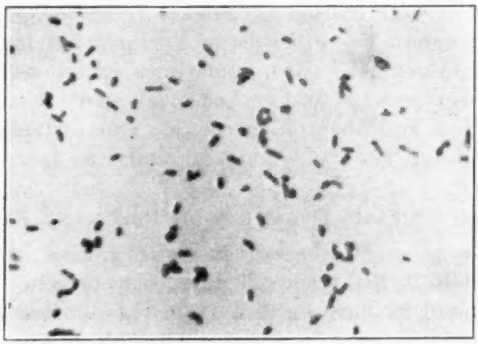

FIG. 1. Organism causing abortion in ewes (x 1350).

ISOLATION AND CULTURE

The organism grows well on ordinary culture media, a luxuriant growth being obtained on plain nutrient agar in 24 hours. It can be isolated from fetal membranes, uterine fluids and from aborted fetuses, quite commonly, in pure culture. It is aerobic, facultatively anerobic, and grows best at 37° C., although it develops slowly at 20° C.

Gelatin is not liquified and blood-serum is not attacked. Litmus milk is turned acid in 24 hours. The organism does not produce indol or acetylmethyl-carbinol. Nitrates are reduced to nitrites. In carbohydrate broths it produces about 40 per cent gas, consisting of 1 part carbon dioxide to 1.5 parts hydrogen.

It ferments dextrin, dextrose, dulcitol, galactose, glycerol, lactose, levulose, maltose, mannite, raffinose, rhamnose, salicin, sor-

bitol sucrose and xylose, with the production of acid and gas, although the fermentation is slow in glycerol and salicin. It does not attack inositol.

The organism differs in many ways from the *B. coli*-like organism reported by Howarth[7] as causing abortion in sheep. There is no organism listed in Bergey's "Manual of Determinative Bacteriology" with which it agrees and therefore it cannot be assigned a species name.

Summary and Conclusions

Abortion in ewes in northwestern Wyoming was encountered which was found to be infectious. A total of approximately 500 ewes aborted out of a flock of 1,050. An organism was consistently isolated from the field material which would reproduce abortion experimentally in pregnant ewes. Koch's postulates were satisfied. A study was made of the morphological, cultural and physiological characteristics of the organism. No records are available which would identify it and it is believed it has never been reported.

Since the vaginal discharges of aborting ewes produced abortion and the organism was present in the vaginal discharges, it is probable that the disease spread by means of the vaginal discharges. The water was from a rapidly flowing river. The trouble lasted over too long a period for the water to have been other than the initial cause, because other sheepmen experienced no trouble from watering in the river. Perhaps the first infection took place by ingestion of the organism with water and the virulence was increased by passage through the aborting ewes. Then the vaginal discharges became very infectious.

Acknowledgment

The authors wish to thank Dr. H. D. Port, State Veterinarian, Cheyenne, Wyoming, for coöperation in the work.

References

[1]M'Fadyean, J., and Stockman, S.: A Report of the Departmental Committee Appointed by the Board of Agriculture and Fisheries to Inquire into Epizoötic Abortion. Part III and appendix to Part III, Abortion in Sheep. (Wyman and Sons, Ltd., London, 1912).

[2]Stockman, S.: Vibrionic abortion. Jour. A. V. M. A., lv (1919), n.s. 8 (5), pp 499-504

[3]Carpenter, C. M.: Researches upon a spirillum associated with abortion in ewes. An. Rpt. N. Y. State Vet. Coll., Cornell Univ., 1918-1919 (1920).

[4]Welch, H., and Marsh, H.: Vibrionic abortion in sheep. Jour. A. V. M. A., lxv (1924), n.s. 18 (2), pp. 203-210.

[5]Graham, R., and Thorp, F., Jr.: Vibrionic abortion in sheep. Jour. A. V. M. A., lxxvi (1930), n.s. 29 (4), pp. 568-573.

[6]Bruce, E. A.: Brucelliasis in sheep. Jour. A. V. M. A., lxxvi (1930), n.s. 29 (6), pp. 841-842.

[7]Howarth, J. A.: *B. Coli*-like organism causing aborting in sheep. Corn. Vet., xxii (1932), 3.

DISCUSSION

DR. FRANK THORP: Does this organism produce a slimy clot?

DR. LEE: No.

DR. L. E. STARR: Was there anything unusual in the feeding or management of this flock that might have contributed to the condition?

DR. LEE: At first, before we did any work on it, we thought the trouble was due to mismanagement. We investigated the feeding and found the ewes getting native hay.

DR. STARR: They were not being fed differently from other flocks in the same neighborhood?

DR. LEE: No; just the same, they were handled like the rest of the sheep men were handling their flocks in the Big Horn Basin.

Bureau Transfers

DR. J. P. MACK (N. Y. U. '17), from Jacksonville, Fla., to Atlanta, Ga., on tuberculosis eradication.

DR. E. A. MAIER (Tex. '32), from Omaha, Neb., to Fort Worth, Texas, on meat inspection.

DR. D. L. BERRY (K. S. C. '32), from Chicago, Ill., to Fort Worth, Texas, on meat inspection.

DR. A. L. STIGERS (Iowa '30), from Sioux City, Iowa, to Des Moines, Iowa, on meat inspection.

DR. JOSHUA F. MEYER (Colo. '35), from Cleveland, Tenn., to Baltimore, Md., on meat inspection.

DR. E. W. BURKE (Iowa '15), from Marshalltown, Iowa, to Waterloo, Iowa, in charge of meat inspection.

DR. JAMES D. YOUNG (McK. '18), from Madison, Wis., to Watertown, S. Dak., on meat inspection.

DR. HARRY J. HOYMAN (Chi. '04), from Waterloo, Iowa, to Fort Dodge, Iowa, in charge of meat inspection.

DR. DANFORD L. COX (O. S. U. '35), from Madison, Wis., to Waterloo, Iowa, on meat inspection.

DR. EDWARD H. LENHEIM (St. Jos. '16), from Madison, Wis., to Cleveland, Ohio, on meat inspection.

DR. MERWIN L. CRANS (K. C. V. C. '16), from Kansas City, Kan., to Marshalltown, Iowa, in charge of meat inspection.

DR. EMIL H. INGOLD (Chi. '18), from Chicago, Ill., to Detroit, Mich., on meat inspection.

DR. OWEN HINTON (Ont. '25), from Newark, N. J., to Ocala, Fla., in charge of meat inspection.

DR. EDWIN S. RING (Amer. '13), from Jersey City, N. J., to Newark, N. J., on meat inspection.

DR. SHIRLEY SHEPARD (Ga. '32), from Chicago, Ill., to Atlanta, Ga., on meat inspection.

DR. R. R. YOUNCE (Colo. '35), from Logan, Utah, to Chicago, Ill., on meat inspection.

DR. CÉSAR CLAVELL (Tex. '35), from Chicago, Ill., to San Juan, P. R., on field inspection.

DR. C. L. HALL (U. S. C. V. S. '10), from Newark, N. J., to Ottumwa, Iowa, on meat inspection.

DR. DANIEL P. ARRON (Wash. '36), from Seattle, Wash., to South Saint Paul, Minn., on meat inspection.

DR. W. W. BOGGIE (Iowa '21), from Mitchell, S. Dak., to Fort Dodge, Iowa, on meat inspection.

FOWL LEUKOSIS*

By E. L. STUBBS, *Philadelphia, Pa.*
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University of Pennsylvania

Fowl leukosis is a term most commonly used to include leukemia and leukemia-like diseases of fowls. It is a disease of several different types that occur with or without definite blood changes. Some types have been shown to be transmissible, facilitating their study, while others are not well understood.

Studies of fowl leukosis have led some investigators to believe that a leukosis agent is a single entity and, when proper conditions are supplied, always produces the same result. Other investigators believe that a single etiological agent may stimulate more than one type of cell to unrestricted growth, producing both leukosis and tumors. Other investigators believe that a single etiological agent may produce a wide variety of manifestations, as leukemia, lymphomatosis, fowl paralysis, iritis and mixed types. The studies to be reported in this discussion are with a strain (I) of transmissible leukosis that has remained constant and essentially the same over a period of eight years.

Ellermann and Bang[1] were the first to demonstrate that some forms of leukosis could be transmitted from chicken to chicken. Ellermann and Bang[2] later passed the disease through six generations and reproduced the disease by a filtrate obtained from passing organ extracts through a Berkefeld filter. Hirschfeld and Jacoby[3] succeeded in transmitting a disease, similar to that of Ellermann and Bang, through five generations. Schmeisser[4] obtained a strain of leukemia, that he believed to be myelogenous leukemia and studied its transmission. Ellermann[5] described the diseases of the hematopoietic system of the fowl, discussing conditions that caused an alteration in the blood and some that did not. He described an alteration sometimes found in which large numbers of immature erythrocytes were found in the circulating blood, producing a condition that he designated "erythroleukosis." The granular leukocytes and their precursors were greatly increased in other cases that he designated "myeloid leukosis."

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Furth[6] obtained a strain from a market fowl that was readily transmitted from fowl to fowl. Stubbs and Furth[7] have shown by a systematically controlled experiment, in which equal numbers of injected chickens and controls were used, that leukosis can be transmitted by injection and does not occur in controls. Two types of leukosis occurred among the injected fowls, one showing a blood picture of large numbers of erythroblasts and was called, after Ellermann, "erythroleukosis," and the other showing a blood picture with large numbers of myeloblasts, and called "myeloid leukosis." Differentiation of the two types with certainty could not be made by postmortem appearance alone, but could be made with microscopic examination of the blood, liver, spleen and bone-marrow. The two types appeared to be closely related and one type or the other developed independently of the type used for injection. Stubbs and Furth[8] have obtained other strains of transmissible leukosis from various flocks and have described anemia and leukosis occurring spontaneously in the common fowl.

Jarmai[9] described leukosis not as an infectious disease but as a tumor-like process. Patterson and his coworkers[10] considered all the various types of leukosis as different expressions of the same transmissible disease. Johnson[11] accepts the view that the various types are due to a single agent and uses the term "hemocytoblastosis" to include the various types. Furth[12] described a strain of leukosis that is transmissible and occurs with and without blood alteration. This strain may cause lymphomatosis, with or without tumor formation, and may cause myelocytomatosis and endothelioma. Oberling and Guerin[13] described a strain that they believed produced both leukosis and sarcoma and probably carcinoma, and suggested that a mutation occurred with a substance that had an affinity for both mesodermal and ectodermal tissues.

Troisier[14] repeated similar experiments with the same results. Rothe Meyer and Engelbreth-Holm[15] described a strain that produced leukosis and sarcoma but not carcinoma. Stubbs and Furth[16] described a strain that produed leukosis and sarcoma. This strain injected intravenously produced erythroleukosis frequently with diffuse sarcomatosis of the bone-marrow and spleen and, when injected intramuscularly, produced sarcoma at the site of injection. This strain was readily transmitted by filtrate and could be preserved by drying. Jarmai[17] described a strain of erythroleukosis that produced small fibrosarcoma at the point of injection in fowls that did not succumb to erythroleukosis within

a short time. The sarcoma of Rous[18] does not produce leukosis. Furth[19] described three strains of sarcoma (11, 12 and 15), none of which produce leukosis.

The investigations cited indicate differences in various leukosis strains. Our strain I is a transmissible strain and originated from a chicken obtained from the poultry market in Philadelphia, in 1929. The greatest number of successful injections has resulted from the injection of whole blood from affected chickens given intravenously into susceptible chickens. The period of incubation varies from about one week to four months. One series of 48 chickens showed periods of incubation from 16 to 49 days, with an average of 30 days. Other things being equal, the younger the chicken the shorter the period of incubation. The first noticeable symptom is a paleness most marked about the comb and wattles. Birds in the early stages are active, eat well and frequently remain in good flesh. With increasing paleness there develops a decided yellowing of the unfeathered portions and the appearance of icterus. The skin bleeds easily, particularly where the feathers are rubbed or pulled and when pecked by other chickens.

Chickens frequently die before the disease can be detected clinically. Usually the chickens are in good flesh although sometimes weight is lost rapidly. A few chickens improve temporarily only to succumb later, and a few apparently recover, some succumbing to reinjection and a few resisting subsequent exposure. Rigor mortis sets in early and becomes complete in a very short time. Necropsy frequently shows the feathers to be bloody. After removing the skin, hemorrhages are found scattered over and through the muscles of the breast and thighs. The thymus is bright red in color. The liver is swollen, with rounded edges, and is very friable.

One series of chickens, when placed on experiment, weighed from 710 to 1,000 gm each. The birds with leukosis died earlier than the time the controls were killed, and at death averaged 991 gm, whereas the controls when killed averaged 1,711 gm. The livers of the leukosis chickens weighed from 73 to 154 gm, averaging 82 gm, whereas the livers of the control chickens showed an average weight of 42 gm. The spleen is usually swollen and paler than normal in color. The above series showed the spleens from the leukotic fowls swollen and weighing 15 to 37 gm, averaging 20 gm, or four times the average weight of 5 gm in the control chickens. Rupture of the liver or spleen with fatal hemorrhage frequently occurs. The bone-marrow is swollen, pale

grayish or reddish, and its consistency increased so that it can be removed *en masse*.

Microscopically, the most characteristic feature is the blood stasis in the capillaries and sinusoids of the liver and in other organs. Usually the large numbers of immature cells flooding the circulation are intravascular, although there may be perivascular accumulations and foci of immature cells. The spleen shows accumulations or immature cells in the pulp and encroaching on the follicles. The bone-marrow shows the blood-vessels crowded and dilated with immature cells. The fat of the marrow disappears and the bone-marrow becomes a mass of immature cells.

Myeloid leukosis shows myeloid cells in various stages of development beginning outside the blood-vessels of the bone-marrow as an extravascular process, but these cells soon flood the circulation. Myeloblastic and myelocytic foci are also found in the liver and spleen.

The transmission of fowl leukosis has been most uniformly successful by the injection of whole blood from affected chickens into normal chickens. Successful infection with this method varies but in some instances all of some groups of injected chickens become affected. Transmission has also been accomplished by material free of cells. Filtered material produces leukosis, but apparently not so uniformly as whole blood or blood-cells free of plasma. The causative agent appears to be less concentrated in filtered material than in whole blood or in material without any cells. Organ suspensions or emulsions are less effective and do not so uniformly produce infection.

During the past two years, we have made further injections of strain I into chickens, administered chiefly by intramuscular injections to try out further its infectivity and particularly to try and determine whether it would produce tumor at point of injection. So far all results have been negative.

We started by using chicken 6299 as a donor, with a typical case of erythroleukosis. Blood from this chicken was injected intravenously into five young chickens. The blood was given intravenously to establish a strain suitable for further experiments. Two typical cases of myeloid leukosis developed as a result of the injections. One case, that in chicken 172, was considered most suitable for transfer. The next series of six chickens was injected both intravenously and intramuscularly with whole blood. Two cases of leukosis followed, but there was

no development of a tumor at the site of injection in any chicken. A third transfer was made from chicken 177 which showed myeloid leukosis. Two cases of leukosis developed and chicken 188, showing the myeloid type, died 18 days after injection. After death, an emulsion was made of the liver and spleen in Ringer's solution and was injected into four chickens, each of which developed leukosis. Two cases were erythroleukosis and two were myeloid leukosis. One of each type was selected as suitable for a larger experiment. Blood was used for injection into the left breast and an emulsion of liver in Ringer's solution was injected into the right breast, each material being injected in 1-cc amounts.

Chicken 203 was selected as a typical case of erythroleukosis. Blood was withdrawn into a 1:1,000 solution of heparin to prevent clotting and 1 cc was injected into the left breast of each of 18 chickens. Chicken 203 was then killed and the swollen liver and spleen were finely minced in an equal amount of Ringer's solution, after which 1 cc of this suspension was injected into the right breast of the same 18 chickens. Chicken 200 was selected as a typical case of myeloid leukosis. Blood was withdrawn into a 1:1,000 solution of heparin to prevent clotting and was injected intramuscularly in 1-cc amounts into the left breast of each of six chickens. Chicken 200 was killed and the liver and spleen were removed and finely minced in an equal quantity of Ringer's solution, after which 1 cc of this organ suspension was injected into the right breast of each of the same six chickens. No tumor or swelling developed at the site of injection of any of these 24 chickens.

Thirteen cases of leukosis with marked blood alterations occurred. Two of these cases with typical blood changes were selected for further transfer. One (223), was transferred by taking the liver and mincing it finely in an equal amount of Ringer's solution, after which 1 cc of this liver suspension was injected intramuscularly into the left breast of each of ten young chickens. Chicken 235 was also selected for transfer. Blood was withdrawn into a 1:1,000 solution of heparin to prevent clotting and 1 cc of this was injected into the left breast of 18 young chickens. Chicken 235 was killed, the liver removed and finely minced in an equal quantity of Ringer's solution, after which 1 cc of this liver suspension was injected intramuscularly into the right breast of each of the same 18 chickens. Twelve cases of leukosis developed in this series but in no case could any swelling or tumor formation be detected at the site of injection. Subse-

quent injections have also been made as shown in the chart (figure 1) but no tumors have resulted.

In the course of these experiments chicken 201 warrants special mention and is shown in a separate chart (figure 2). This chicken was first injected on November 23, 1936, with 0.5 cc of liver and spleen emulsion from a leukotic chicken. The first blood alteration was detected on blood smears on December 15, 1936, or 22 days after injection. The condition of the chicken remained good, its blood became normal as far as could be

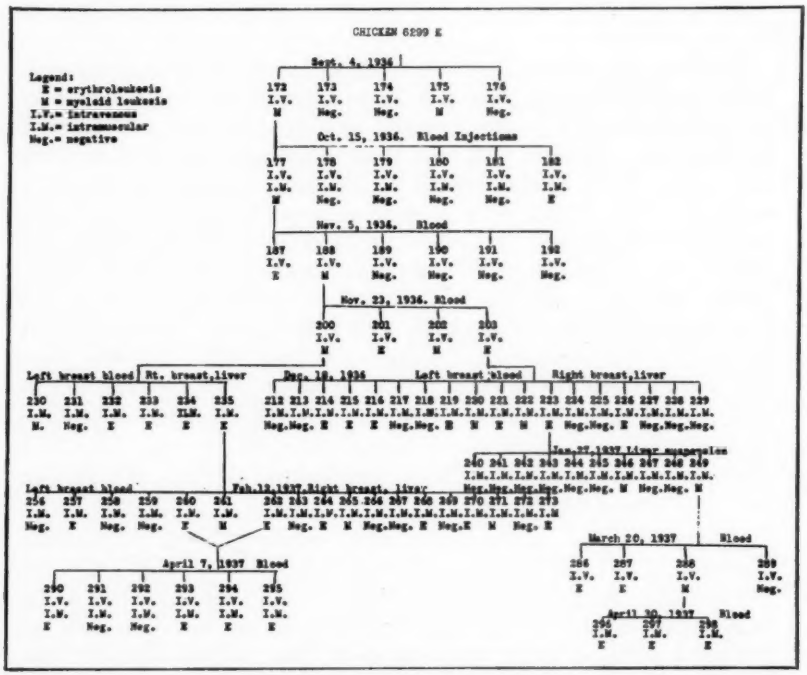
CHICKEN 6299 E
Legend:
E = erythroleukosis
M = myeloid leukosis
I.V.= intravenous
I.M.= intramuscular
Neg.= negative
Sept. 4, 1936
172 I.V. M
173 I.V. Neg.
174 I.V. Neg.
175 I.V. M
176 I.V. Neg.
Oct. 15, 1936. Blood Injections
177 I.V. I.M. M
178 I.V. I.M. Neg.
179 I.V. I.M. Neg.
180 I.V. I.M. Neg.
181 I.V. I.M. Neg.
182 I.V. I.M. E
Nov. 5, 1936. Blood
187 I.V. E
188 I.V. M
189 I.V. Neg.
190 I.V. Neg.
191 I.V. Neg.
192 I.V. Neg.
Nov. 23, 1936. Blood
200 I.V. M
201 I.V. E
202 I.V. M
203 I.V. E
Left breast blood
Rt. breast,liver
Dec. 18, 1936
Left breast blood
Right breast,liver
230 I.M. M.
231 I.M. Neg.
232 I.M. E
233 I.M. E
234 I.M. E
235 I.M. E
212 213 214 215 216 217 218 219 220 221 222 223 224 225 226 227 228 229
I.M. I.V. I.M. I.V. I.M. I.V. I.M. I.V. I.M. I.V. I.M. I.V. I.M. I.V. I.M. I.V. I.M. I.V. I.M. I.V. I.M. I.V. I.M. I.V. I.M. I.V. I.M. I.V. I.M. I.V. I.M.
Neg. Neg. E E E Neg. Neg. E M E M E Neg. Neg. E Neg. Neg. Neg.
Jan. 27, 1937 Liver suspension
240 241 242 243 244 245 246 247 248 249
I.M. I.V. I.M. I.V. I.M. I.V. I.M. I.V. I.M. I.V. I.M. I.V. I.M. I.V. I.M. I.V. I.M. I.V.
Neg. Neg. Neg. Neg. Neg. Neg. M Neg. Neg. M
Left breast blood
Feb. 13, 1937. Right breast, liver
256 257 258 259 260 261 262 263 264 265 266 267 268 269 270 271 272 273
I.M. I.M. I.M. I.M. I.M. I.M. I.V. I.M. I.V. I.M. I.V. I.M. I.V. I.M. I.V. I.M. I.V. I.M. I.V. I.M. I.V. I.M. I.V. I.M. I.V. I.M. I.V. I.M. I.V. I.M.
Neg. E Neg. Neg. E M E Neg. E M Neg. Neg. E Neg. E M Neg. E
March 20, 1937 Blood
286 I.V. E
287 I.V. E
288 I.V. M
289 I.V. Neg.
April 7, 1937 Blood
290 I.V. I.M. E
291 I.V. I.M. Neg.
292 I.V. I.M. Neg.
293 I.V. I.M. E
294 I.V. I.M. E
295 I.V. I.M. E
April 20, 1937 Blood
296 I.M. E
297 I.M. E
298 I.M. E

Fig. 1. Record of transmission of fowl leukosis from chicken 6299 through several generations.

determined by blood-smears, and it had apparently recovered by January 19, 1937. A short time later, on February 2, 1937, there appeared on blood-smears many polychrome erythrocytes and erythroblasts. A severe anemia developed and typical erythroleukosis. The blood-picture varied between severe anemia, erythroleukosis and myeloid leukosis, for the next three months.

On May 25, 1937, there was a very severe myeloid leukosis showing many mitotic figures and many immature cells with

double nuclei. This chicken was bled to death on May 26, 1937. The postmortem examination was typical of myeloid leukosis. Blood from this chicken was injected intravenously into three chickens four weeks old and three chickens four months old. A liver emulsion was prepared and injected into the right breast of each chicken. Each of the three small chickens developed blood alterations characteristic of erythroleukosis 13 days after injection. One chicken (326) died six days later with typical erythroleukosis and without any swelling at the point of injection. Chicken 327 died eight days later, with typical erythroleukosis.

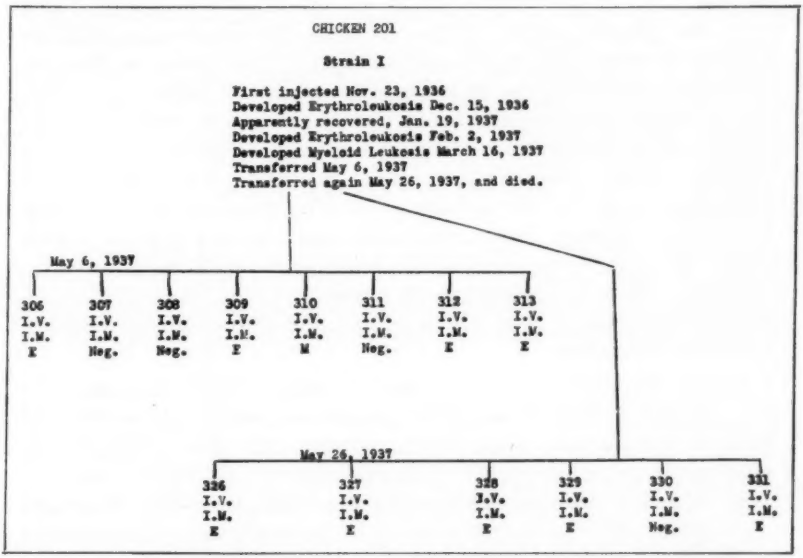
CHICKEN 201
Strain I
First injected Nov. 23, 1936
Developed Erythroleukosis Dec. 15, 1936
Apparently recovered, Jan. 19, 1937
Developed Erythroleukosis Feb. 2, 1937
Developed Myeloid Leukosis March 16, 1937
Transferred May 6, 1937
Transferred again May 26, 1937, and died.
May 6, 1937
306 I.V. I.M. E
307 I.V. I.M. Neg.
308 I.V. I.M. Neg.
309 I.V. I.M. E
310 I.V. I.M. M
311 I.V. I.M. Neg.
312 I.V. I.M. E
313 I.V. I.M. E
May 26, 1937
326 I.V. I.M. E
327 I.V. I.M. E
328 I.V. I.M. E
329 I.V. I.M. E
330 I.V. I.M. Neg.
331 I.V. I.M. E

Fig. 2. Record of transmission of fowl leukosis from chicken 201.

The third one (328) was bled eight days after developing erythroleukosis, or 21 days after injection and its blood transferred. The older chickens developed blood alterations about one week later.

Discussion

These experiments were undertaken to try out strain I for any tumor-producing quality. Other investigations cited indicate that some leukosis strains have the property of producing leukosis and also producing tumors. In some instances it appears that, when the material containing the causative agent is introduced intravenously, leukemia is produced and when injected into

the tissues, as intramuscularly, a tumor is produced. In such cases it appears that some causative agents may stimulate more than one type of cell to unrestricted growth. Some experiments indicate that organ extracts, particularly liver suspensions or transplants from leukotic fowls, when introduced intramuscularly, stimulate the connective tissue elements at point of injection to tumor growth.

Previous experiments have indicated that the causative agent of strain I is most concentrated in the whole blood, because the greatest number of successful injections follow the injection of whole blood into susceptible chickens. Similarly blood-cells washed free of plasma result in a higher percentage of takes than the plasma alone. Filtered material produces a smaller number of takes than unfiltered material. This indicates that the causative agent may be in close association with the cells. The use of whole blood would seem suitable for use in trying out the ability of material containing the causative agent to produce tumors. Fifty-nine chickens were injected with whole blood intramuscularly to try out its ability to produce tumors. The blood was collected from seven different donors, four of which were suffering from myeloid leukosis and three from erythroleukosis. The injections were made into the breast muscles. Thirty-five cases of leukosis developed but there was no evidence of tumor formation.

Organ suspensions of the livers of leukotic fowls were used to try out the ability of leukotic tissues to produce tumors at the site of inoculation. The organ suspensions were prepared by mincing leukotic liver with an equal amount of Ringer's solution and injecting this suspension intramuscularly. The injections were made into the breast muscles of normal fowls. Livers were obtained from fowls affected with erythroleukosis and with myeloid leukosis. Myeloid leukosis exhibits a greater tendency towards extravascular proliferation and it might be considered more likely to produce a tumor. Fifty-two chickens were injected with leukotic liver material given intramuscularly to try out the ability of strain I to produce tumors. The livers were obtained from four different donors, two of which were suffering from erythroleukosis and two from myeloid leukosis. The injections were made into the breast muscles. Twenty-six cases of leukosis developed but there was no evidence of tumor formation found at the site of injection.

The only result produced by such injections was the production of erythroleukosis and myeloid leukosis similar to that found

after the intravenous injection of similar materials. No evidence was found to indicate that strain I has any relationship to the production of tumors. No cases of fowl paralysis occurred in this series of chickens, and no evidence was found to indicate that strain I has any relationship to paralysis.

SUMMARY

Fowl leukosis is a term used most commonly to include leukemia and leukemia-like diseases of fowls. It occurs in several different types, some of which have been shown to be transmissible, facilitating their study, while others are not well understood.

Strain I is a type of transmissible leukosis that has remained constant and essentially the same over a period of eight years. It is most easily transmitted by injections of blood from affected to normal chickens. The period of incubation is variable from one week to four months. Other things being equal, the younger the fowl the more susceptible. The clinical features are not marked and diagnosis cannot be made with certainty by post-mortem appearance. Microscopically in the later stages there is blood-stasis and a flooding of the circulation with immature cells. Two forms may be found; one in which there is a predominance of immature erythrocytes, designated erythroleukosis; another with large numbers of myeloid cells, designated myeloid leukosis.

Strain I has been studied for its tumor-producing ability, since investigations show that at least some leukosis strains may produce tumors. The whole blood of fowls suffering from strain I leukosis was used to inject normal chickens. The blood was obtained from seven different donors, three of which were suffering from erythroleukosis and four of which were suffering from myeloid leukosis. Fifty-nine chickens were injected intramuscularly with whole blood. Thirty-five cases of leukosis were produced but there was no evidence of tumor formation. Livers from leukotic chickens were also used to try out the ability of leukotic tissues to produce tumors. The livers were obtained from four different donors, two of which were suffering from erythroleukosis and two suffering from myeloid leukosis. Fifty-two chickens were injected intramuscularly into the breast muscles with leukotic liver material. There followed 26 cases of leukosis but there was no evidence of tumor formation at the point of injection.

No evidence was found to indicate that strain I has any relationship to the production of tumors. No cases of paralysis

occurred in this series of chickens and no evidence was found to indicate that strain I has any relationship to paralysis. The only result following the injection of whole blood and leukotic liver intramuscularly was the production of erythroleukosis and myeloid leukosis similar to that found after the intravenous injection of similar substances.

These experiments indicate that strain I is a pure strain and has only the ability to stimulate the hemapoetic tissues to abnormal activity.

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Average Hog Prices in Chicago

During 1933, the average price of hogs on the Chicago market was $4.00, the lowest in many years. The highest average price in recent years was $14.15, reached in 1920. During the first eight months of 1937, the average price was $10.75.

DISEASES OF THE NERVOUS SYSTEM OF LOWER ANIMALS

A Discussion of Some Symptoms and Lesions*

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Contrary to general opinion, lower animals are affected by many definite diseases of the nervous system. Those caused by specific infectious agents, such as rabies, encephalomyelitis of horses, and encephalitis of foxes, because of their tendency to become epizoötic, have received the most attention. There are, however, many sporadic nervous diseases of lower animals. Most of these conditions have been described at some time or other, but because of their comparatively infrequent occurrence and the difficulties encountered in diagnosis, they frequently pass unrecognized. A comprehensive review of these diseases will not be attempted. It is merely my desire to call attention to them and discuss some of the symptoms and lesions that are of diagnostic importance.

For obvious reasons, a veterinarian cannot examine his animal patients neurologically as thoroughly as a physician can his human patients. One cannot, for example, question an animal in regard to the nature and duration of certain obscure symptoms such as headache or sensory and psychic disturbances. The veterinarian, therefore, must rely on the observations of the owner for the clinical history and on his own ability to make an adequate physical examination and to correlate the findings. It is fortunate, indeed, for them that animals do not suffer from the various mental states associated with marital, social, or financial difficulties, chronic alcoholism, syphilis, or addiction to narcotics. Study of nervous diseases in lower animals is therefore almost entirely limited to observation of definite organic lesions and symptoms caused by neurotoxins. Many of these conditions are terminal when they are first recognized.

In order better to understand a discussion of these diseases, a brief review of the anatomy and physiology of the nervous system seems desirable. As in man, the nervous system of lower animals consists of a central nervous system (the brain and spinal cord) and a peripheral nervous system (the cranial and spinal nerves with their ganglia, and the sympathetic nervous system). The neuron is the structural and functional unit of the

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nervous system. It consists of a cell body, axon and dendrites, and its function depends upon its termination. Ganglia are masses of nerve cells, but they have running through them many nerve fibers which extend peripherally and centrally. Nerves are parallel bundles of nerve fibers and the groups of cells of which the nerve fibers are processes are termed "nuclei of origin" or "termination," according to the direction (centrally or peripherally) in which they conduct impulses.[1] This discussion will deal chiefly with diseases of the central nervous system.

Anatomy and Physiology of the Brain

The brain can be grossly divided into three major anatomic units: the cerebrum, cerebellum and medulla. These three units are functionally interrelated. According to Smith,[2] the chief functions of the brain and spinal cord as follows: The cerebrum is the seat of intelligence, psychic functions, voluntary behavior, and coördination of thought and activity. The cortex of the frontal portion contains the motor area, which has to do with voluntary motor activity. The size of this motor area bears a relation to the degree of complexity of the movements of an animal's limbs. It is most highly developed in man. The optic thalamus, which is situated in the base of the cerebrum, is the junction for all afferent impressions prior to their distribution. It also is the seat of painful and pleasurable impressions. Its activities are controlled by the cerebral cortex, and failure to control them is the explanation for certain neurotic conditions in man and for panic in animals. The red nucleus situated in the thalamus gives origin to the rubrospinal tract, an important motor tract in animals. The heat control center is commonly thought of as being in the gray matter near the third ventricle. In our observations we have noted that injury to the tuber cinereum in dogs causes a marked elevation in temperature. The corpus striatum, which is situated in the posterior pole of the cerebrum, exerts control over skeletal muscular activity and tonus; disease in this area causes dyskinesia and rigidity. The corpora quadrigemia and cerebral peduncles form the basal ganglion or midbrain, which constitutes the important highway for nerve impulses between the cerebrum and the body. The corpora quadrigemina have to do with sight, hearing and equilibrium.

The cerebellum, through its connection with the middle ear and the muscles of the eyeball, and by means of the vestibulospinal tract and the motor cells of the spinal cord, has control of harmony and coördination of movement and equilibrium. If both

hemispheres of the cerebellum of a dog are partially removed, the gait is rendered uncertain and the animal staggers and is unable to maintain its equilibrium. Injury to one hemisphere is said to cause a dog to move in a circle or to roll toward the affected side. Each half of the cerebellum controls the muscular system on its particular side of the body; it receives impulses from the opposite side.

The medulla is the pathway by which the periphery communicates with the brain and the brain with the periphery. It also is an important cell center and restarts all tracts which terminate in the bulb on their way up or down and gives origin to or is connected with all of the cranial nerves except those of smell and sight and the muscles of the eyeball. It is the reflex center for the mechanisms most important to life, namely, respiration, circulation, and the action of the heart and digestive apparatus. If the spinal cord is sectioned above the fifth cervical vertebra, death ensues rapidly because of respiratory failure.

The Spinal Cord

The spinal cord is the direct continuation of the medulla and acts as the pathway to convey impulses from the brain to all parts of the body and from the periphery to the brain. It also contains some special nerve centers. The ciliospinal center, which is situated between the cervical and thoracic portions of the spinal cord, gives origin to fibers which, through the sympathetic nervous system, innervate the dilator muscles of the iris. Destruction of this center causes contraction of the pupil, and irritation of this center causes dilatation of the pupil. In the lumbar portion of the spinal cord are situated the anospinal, vesicospinal and genitospinal centers. Destruction of these centers causes fecal and urinary incontinence. Vasomotor centers are found throughout the spinal cord.

The various functional effects and symptoms caused by neurotoxins or lesions in the various component parts of the nervous system cannot conveniently be discussed in the foregoing order, so they will be discussed according to the symptoms manifested. I shall try to define the symptoms and mention some of the conditions or lesions which cause their occurrence.

Hutyra and Marek[3] said that organic diseases of the brain and its membranes may be characterized by symptoms of a general nature, by focal symptoms, or by both. This quite adequately expresses how indefinite symptoms of disease of the nervous system can be. It is difficult, and frequently impossible, to

differentiate the symptoms caused by a tumor from those of an abscess or other inflammatory lesion in the brain. Indeed it not infrequently is impossible to differentiate the symptoms caused by definite organic lesions from those due to functional disorders in which lesions are absent. This also is true as regards definitely localizing certain lesions in the cortex, basal ganglion, cerebellum, or spinal cord. The symptoms manifested may be similar.

History Should Be Obtained

Before proceeding with physical examination of an animal, one should make inquiry of the owner regarding the feeding and care of the animal as well as about all past illnesses or injuries that it may have suffered. Changes in habits, behavior or intelligence, attacks of hysteria, convulsions, ataxia, vomiting, and urinary and fecal incontinence are important symptoms when diseases of the nervous system are being considered. The duration of these symptoms and the conditions under which they were first noticed should, if possible, be ascertained. The animal's gait, attitude, expression and behavior should be observed carefully before it is handled and its reaction to being examined should be noted. A careful search should be made for anatomic irregularities and wounds. An enlarged skull, for example, might indicate hydrocephalus, intracranial tumor, or a tumor of the skull. Self-inflicted wounds and trophic ulcers on the extremities or around the anus not infrequently are associated with lesions of the spinal cord or peripheral nerves causing trophic or sensory disturbances. Atrophy of muscles and muscle spasms always are significant. The tendon, laryngeal, anal and pupillary reflexes should also be observed. If the presence of a brain lesion is suspected, the pupil should be dilated and the fundus of the eye and the optic papilla should be examined through an ophthalmoscope. Tests for sensory loss are not so reliable and efficient in lower animals as in man but they nevertheless should be made. They can be made by sticking the finger into the ear, by pricking the skin with a needle, by pinching a toe, an ear, or the tail, and by faradic stimulation. It is always good practice to make repeated observations of an animal when disease of the nervous system is suspected and never to be too hasty in arriving at a diagnosis.

Since the cerebrum, and particularly its cortex, is the seat of intelligence, the coördination of thought, and so forth, disease in this portion of the brain interferes with normal thought, sensation and volition. Various disturbances in consciousness and

increased or decreased psychic reactions to external or internal stimuli are the most constant symptoms noted in cerebral disease. It must be borne in mind, however, that mental disturbances may occur secondarily with many infectious diseases, febrile conditions, intoxications, uremia, hypoglycemia, hypocalcemia, myxedema, and following ingestion of narcotics and various poisons. Malkmus[4] correctly stated that "mental disturbances can be ascribed to local causes only when the possibility of a general cause is eliminated."

Disturbances of Consciousness

Disturbances of consciousness are manifested by abnormal excitement or by abnormal depression. Excitement is caused by irritation of the cerebral cortex due to various causes. Depression may follow excitement, but it can be caused by diffuse destructive disease of the cerebrum, cerebral anemia, or by increased intracranial pressure alone. Dulness is the mildest form of depressive symptom, coma the most severe. Depression also is manifested by drowsiness, and by slow, uncertain or interrupted movements. An animal affected with disease of the cerebrum may appear to fall asleep suddenly and if in the act of eating will cease mastication and permit the food to drop from its mouth. If forced to step over projecting objects on the floor, an affected animal may fail to lift its feet sufficiently and will stumble or fall. If such an animal is placed in a corner, it may remain there as if unable to find its way out. Animals so affected may respond to stronger stimulation, but they soon lapse into their former lethargic state. In coma only respiration and heart action persist, all conscious actions and reflexes are abolished.

Vertigo and syncope are transitory disturbances of consciousness and equilibrium. Syncope is the most severe of these two conditions and is characterized by a sudden temporary loss of consciousness, associated or attended with a marked lowering of the blood-pressure; the pulse may be imperceptible. These symptoms may be caused by localized lesions in the brain, such as the cysts of parasites, tumors, abscesses, slight hemorrhages, or by passive cerebral congestion or anemia.

Apoplexy is characterized by sudden paralysis and, sometimes, by loss of consciousness which may persist until death. It can be caused by an effusion or extravasation of blood or serum into or around the brain or spinal cord and by embolism or thrombosis.

Spasms are involuntary muscular contractions. They usually have their origin in the cortex or basal ganglion of the cerebrum, and the anterior horns of the spinal cord. They are a common symptom of certain functional disorders, parathyroid tetany and some other conditions of calcium deficiency. It is of diagnostic importance to note that spasms originating in the cerebrum frequently are attended by mental disturbances.

Spasms General or Local

Spasms may be general or local. They are classified according to their severity, duration and extent as tremors, or as trembling, clonic, tonic, tetanic and convulsive spasms. The term "tremor" or "trembling" is self-explanatory. Such symptoms usually are due to lesions in the basal ganglion. The term "clonic" is used to denote spasms of short duration, which are followed immediately by relaxation. They may be rhythmic or arrhythmic in occurrence. Rhythmic clonic spasms frequently are observed in dogs following an attack of canine distemper. These spasms commonly are referred to as "chorea of dogs" or "distemper tic." Rhythmic clonic spasms usually have their origin in the basal ganglion of the cerebrum.

Tonic spasms have not been well defined, but the term generally is used to describe persistent spasms or cramps. They may be caused by functional disorders, calcium deficiency, or by pressure on the cerebellum or brain-stem due to various causes.

Tetanic spasms are severe spasms that continue for some time without relaxation. They are similar to tonic spasms except that they are more severe. They may cause marked flexion of the body, such as pleurothotonus and opisthotonos, extension of the limbs, elevation or clamping down of the tail and trismus. This type of spasm is commonly observed in tetanus.

Convulsive spasms are characterized by the sudden contraction of all voluntary muscles. When attended by loss of consciousness the condition is termed an "epileptiform convulsion." This last type of convulsion is frequent in dogs and commonly is referred to as a "fit." The etiology of convulsive spasms is various. They may be due to hysteria, functional disturbances, hypocalcemia, hypoglycemia, uremia, meningeal irritation, cerebritis, brain abscess, intracranial tumors, or increased intracranial pressure from any cause.

A disease termed "cortical or jacksonian epilepsy" is characterized by sudden loss of consciousness attended by tonic-clonic spasms affecting certain groups of muscles, or occasionally all

of the muscles on one side, for varying periods of time. It is caused by certain focal lesions in the cerebral cortex. I observed one case of what appeared to be typical cortical or jacksonian epilepsy in an aged dog. This animal had received a severe blow on the head when about one year of age, and thereafter he manifested symptoms typical of cortical epilepsy. Whenever he was subjected to any unusual excitement, all of the muscles on one side were affected. Apparent recovery usually occurred in ten to 15 minutes.

Meningitis causes paralysis and spasms of the muscles of the neck as a result of motor irritation; it rarely causes disturbances of consciousness, such as excitement or depression. Encephalitis, on the other hand, causes regional or general paralysis and disturbances of consciousness are common.

The term "ataxia" refers to incoördination of movements and equilibrium. It generally is caused by disease in the cerebellum and basal ganglion, but it also is seen in the case of certain lesions of the frontal lobe of the cerebrum and in the spinal cord.

Involuntary Movements

Involuntary movements are caused by irritative lesions in the cerebrum, midbrain, or cerebellum. This symptom is most frequently observed in inflammatory diseases of the brain, abscesses, tumors, parasitic cysts, intracranial hemorrhage and hydrocephalus. An affected animal may walk or trot continuously until it is stopped or falls. The direction of travel not infrequently is in a circle, and it may be forward or backward. The head frequently is carried in an unnatural, elevated or lowered position. The animal may run into obstacles or into a corner as if blind or unconscious.

In chronic disease of the cerebrum in which equilibrium is not disturbed, animals frequently stand with their legs in unnatural positions, apparently without being conscious of it. This is more noticeable in horses than in small animals and is a common symptom of internal hydrocephalus.

Sudden projectile vomiting and convulsions are symptoms frequently associated with markedly increased intracranial pressure and encephalitis. However, these symptoms also are observed in some other diseases.

Increased sensibility is termed "hyperesthesia." It is observed in acute inflammations of the cerebrum and in irritative lesions of the spinal cord and its covering, also in peripheral neuritis. Decreased sensibility is termed "hypesthesia" and it is observed

in chronic affections of the brain, such as tumors, chronic encephalitis, hydrocephalus and narcotic poisoning. It also is seen in certain destructive lesions of the spinal cord, such as myelitis and tumors, and in peripheral neuritis.

It is difficult to localize a lesion definitely in one certain part of the brain in a lower animal by the symptoms manifested. A lesion on the lateral surface of a cerebral hemisphere may cause an animal to walk in a circle in the direction of the affected hemisphere, whereas a lesion in an optic thalamus will cause movement in the opposite direction. However, walking in a circle is not a specific symptom of a localized lesion in these portions of the brain; similar symptoms have been observed in diffuse, acute and chronic encephalitis in dogs.

Malkmus[4] stated that lesions in the frontal pole of the cerebrum or in one of the corpora striata cause a trotting movement of the fore legs and the animal will move forward with the head lowered. A lesion in the posterior pole of the cerebrum causes the animal to hold its head high up or backward, and the animal may move forward rapidly or fall down.

Staggering gait, ataxia and reeling generally are caused by lesions in the cerebellum, although lesions in the midbrain and cortex frequently cause similar symptoms. Twisting of the head on its long axis and rolling movements usually are caused by lesions at the base of the cerebellum; they also, however, may be observed in disease of the middle ear. Nystagmus is a frequent symptom of disease in the cerebellum.

Causes of Pupillary Changes

Contraction of the pupil may be caused by stimulation of the optic and oculomotor nerves by light, by irritative lesions, and by drugs such as pilocarpine or eserine. It also can be caused by destruction of the ciliospinal center in the spinal cord. Dilation of the pupil is caused by paralysis of the optic and oculomotor nerves and by stimulation of the ciliospinal center. Paralysis of the optic and oculomotor nerves may be due to compression or invasion of the nerves by tumors and by certain drugs such as atropine. Dilatation of the pupil may also be caused by lesions in several areas of the brain, and it also occurs in cases of increased intracranial pressure from any cause.

Edema of the optic papilla, so-called choked disk, commonly results from increased intracranial pressure, but it is not diagnostic for any specific lesion. It is more common and earlier in lesions at the posterior cranial fossa. It may occur in diffuse

encephalitis due to cerebral edema resulting from perivascular lymphocytic infiltration.

The term "paraylsis" generally is used to describe any condition in which there is partial or complete loss of power of muscular contraction. When paralysis is incomplete, it frequently is termed "paresis." However, paralysis may be spastic or flaccid. In the former case there is persistent contraction of certain muscles while, in the latter, there is loss of power to contract.

Paralysis may have its origin in the brain, spinal cord, or peripheral nerves. Hemiplegia (paralysis on one side only) usually has its origin in the brain, whereas paraplegia (paralysis on both sides) generally has its origin in the spinal cord. Paraplegia, however, can result from lesions in the basal ganglion and from diffuse disease of the cerebellum. Monoplegia is a condition in which there is paralysis of a single organ or part. It may have its origin in the motor centers of the brain, but usually its origin is in the peripheral nerves.

Psychic Disturbances

A point of diagnostic importance is that paralysis of cerebral origin often is attended by psychic disturbances. This is not noted if the lesion is situated lower in the brain unless hydrocephalus is present. When the lesion causing the paralysis is situated in the brain-stem, functional disturbances of some cranial nerves is not uncommon. Another point of importance is that spastic paralysis and increased reflexes are caused by supranuclear lesions, whereas flaccid paralysis is caused by destructive nuclear, infranuclear or peripheral nerve lesions.

In cases of paralysis due to a lesion in the spinal cord, there usually is paraplegia beyond the point of injury. If the distal portion of the spinal cord has not degenerated and the reflex centers are still functioning, the reflexes may be exaggerated as a result of severance of their cerebral control. Destructive lesions in the spinal cord not infrequently affect the sympathetic nervous system and may cause paralysis of the bowel and urinary bladder. Urinary and fecal incontinence is noted in disease of the lumbar portion of the spinal cord (conus) and not infrequently also in cerebral lesions, especially those in the frontal lobe. Disease in the spinal cord is often attended by sensory paralysis.

In the absence of psychic disturbances a study of the reflexes in the limbs may aid one in determining the seat of disease. Le-

sions in the brain generally cause exaggerated reflexes and are spoken of as supranuclear or upper motor neuron lesions; lesions in the spinal cord, on the other hand, cause exaggerated reflexes below the level of the lesion if the crossed pyramidal tract is involved.

Inflammatory, degenerative and neoplastic lesions are manifested by corresponding symptoms in the periphery to which the cord segment is related. Lesions in the anterior horns which cause degeneration of the motor cells cause flaccid paralysis with decreased reflexes and atrophy of the muscles at the level of the lesion. Lesions in the posterior columns of the spinal cord cause loss of vibratory sense, joint sense and sense of position of a part. This is noted in tabes dorsalis. Lesions of the crossed pyramidal tracts which are situated in the lateral columns of the spinal cord cause spastic paralysis below the level of the lesion. Atrophy of disuse may occur with this. Lesions in the central portion of the spinal cord cause loss of pain and temperature sense but not of sense of touch.

It may generally be stated that irritative lesions are marked by sensory exaggeration, such as hyperesthesia at the level of the lesion, pain and spasm. Degenerative lesions of the spinal cord are marked by anesthesia, paralysis and abolished reflexes at the level of the lesion and exaggerated reflexes below this level. Pachymeningitis is not infrequent in aged dogs; it is slowly progressive and causes pain and paresis according to the extent of involvement. Definite osseous plates or plaques form in the dura. These tend to exert pressure on the spinal nerve roots.

Tumors of the Spinal Cord

A broken back may simulate transverse myelitis, a disease in which there is loss of all sensory and motor innervation below the point of injury. Similar symptoms can be caused by spinal cord tumors. Spinal cord tumors may be extradural, intradural, extramedullary or intramedullary. They are not easily diagnosed in lower animals. The diagnosis of these lesions in man depends upon the history and duration of the disease, on the physical findings, on roentgenographic study and on certain sensory disturbances. Nearly all spinal cord tumors cause pain.

Intradural tumors of the spinal cord generally cause more pain than extradural tumors. A fractured vertebra with slight compression of the spinal cord may simulate these lesions. I have observed marked pain and rigidity of the back and all four legs in a dog with a compression fracture of the seventh cervical

vertebra. Intramedullary tumors of the spinal cord generally cause early symptoms of pain; temperature changes and anesthesia of certain areas are noted as the condition progresses. The symptoms may simulate syringomyelia and hematomyelia. However, pain generally is absent in the latter two diseases. I have experienced difficulty in differentiating between the symptoms of disease in the spinal cord above the conus and those associated with marked hypertrophy of the prostate gland in the dog. I have noted that the former is more persistent, and recovery rarely appears complete.

Other frequent diseases of the spinal cord seen in man, such as anterior poliomyelitis, tabes dorsalis, lateral sclerosis and true spina bifida, have not been observed in lower animals. At least definite cases have not been reported.

Little is known about diseases of the spinal cord in lower animals. Undoubtedly many congenital defects and acquired lesions occur but pass unrecognized. It is my opinion, however, that inflammatory lesions of the spinal cord, such as are seen in post-distemper myelitis, far outnumber all other diseases of this organ.

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Increased Pork Production for 1938 Forecast

The Department of Agriculture has estimated the combined 1937 spring and fall pig crop at 62,227,000 head. This number is about 5 per cent below the 1936 figure. During the 1937 fall season, June 1 to December 1, swine-growers saved a total of about 23,573,000 pigs. The number of pigs saved per litter this fall averaged 6.24, the largest on record. The number of pigs saved per sow in the spring of 1937 also was the largest on record. The combined average of the two crops per sow was 3 per cent larger than in any other year.

The corn-hog price ratio has been favorable to feeding corn to hogs this winter. The number of sows bred to farrow in the spring of 1938 is estimated at 5 per cent over the 1937 figure. These two factors should contribute to increasing pork production figures for 1938.

GASTRECTASIS IN A DOG, WITH SPONTANEOUS RUPTURE OF THE DIAPHRAGM*

By H. D. PRITCHETT, *Philadelphia, Pa.*

Rupture of the diaphragm, with the resultant displacement of the viscera of the cavities which it separates, is not especially rare in clinical canine medicine. Such injuries are usually due to external violence, the trauma being applied in a compressive manner. Automobile or wagon wheels, falling heavy objects, or being trod upon by large animals or humans usually supply the medium by which this force is applied. However, the case reported here is not explainable by any of the foregoing. While the actual occurrence of the diaphragmatic rupture reported is probably of no unusual significance, the fact that such a variety of complications accompanied it was thought sufficient to warrant its recording, even though the termination was by euthanasia.

HISTORY AND SYMPTOMS

The patient was a female fox terrier, six months of age, and in fair physical condition. The history obtained from the owner when the dog was presented for treatment was a bit incoherent and confusing, due to her frenzied state and anxiety, as the client believed the dog had been poisoned. No definite statement could be obtained except that the illness was of sudden occurrence and of 24 hours duration. The temperature was 101.6° F. and the pulse frequency 160. Both the ocular and oral mucous membranes were hyperemic. The tachycardia and the hyperemia of the mucous membranes were suggestive of auto-intoxication, as there was evidence of coprostasis by abdominal palpation and rectal exploration. Tremors were well established. There was an abundance of pustules on the abdomen. Emesis occurred repeatedly, and anorexia was declared by the client to have been the earliest manifestation of illness that was observed.

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The diet had consisted of fruit cake, butcher scraps, and other foods inappropriate for a young dog. (This information concerning the diet was volunteered by another member of the client's household, on a chance meeting after the termination of the case. He stated that, in his opinion, "the dog had never been properly fed, and it had frequently been given enormous quantities of food at one feeding." Contrary to his advice, "the dog had always been fed but once each day, at which time it was usually gorged with food." This individual had no further knowledge of the case.)

Treatment

A saline purgative was administered, and the client advised to withhold all food for the ensuing 48 hours, but to permit the intake of water *ad libitum* providing it was retained. Sodium bicarbonate, 10 grains every 3 to 4 hours, was dispensed. As the dog came from a home in which four canine deaths had occurred from distemper (unknown to the client) during the previous six years, the last occurring only five months previously, 10 cc of homologous anti-canine distemper serum was given subcutaneously, 5 cc over each axilla, as a prophylactic measure. The owner was instructed to avoid undue excitement and exposure of the patient and to return it to the office in two days for further observation.

After the lapse of this period, there was but little change. The pulse was still 160 (the type of which was not recorded) and the temperature 102.0° F. with no change in the condition of the mucous membranes. There had been two bowel evacuations, and the attitude was much brighter. However, the patient had taken neither liquids nor food, as the owner admitted that she had tried to tempt the animal to eat. Emesis had not been repeated.

A saturated solution of magnesium sulfate and milk of magnesia (equal parts, 1 dram every two hours, to be continued until purging ensued) were prescribed, to further stimulate bowel activity and to induce a mild dehydration, thereby producing thirst and thus encouraging the intake of water. (When constipation and intestinal intoxication are present, this would appear to be a rational therapeutic procedure, especially when fluids can be retained. This would eliminate the necessity of parenteral therapy.)

The writer was informed, five days later, that the dog appeared to be normal and was taking food and liquids, after a very thorough purging. Again, three days later, the same informa-

tion was received, supported by the owner's statement that in her judgment the dog required no further treatment.

Diagnosis

Up to this point, no mention has been made of a diagnosis. It should be pointed out that the above covers a period of ten days. For reference, a tentative diagnosis of "indigestion, improper diet, and other chronic undifferentiated disturbances" was written into the clinical record. Further study of this report will reveal that the diagnosis was partially correct. The tolerance of the reader is requested at this point, in consideration of the very incomplete history obtainable.

The patient was seen again, on the 15th day, as an emergency ambulatory case, at which time the anamnesis obtained was comparable to the above. The dog was reported to have been fed as usual and put in the yard for exercise. The yard was fenced, and the dog at that time was what the owner described as "acting like a healthy animal."

The subjective symptoms observed were dyspnea, and a marked degree of excitement and yelping, with spasmodic voiding of urine and formed feces. Apparently the dog was suffering much pain. These symptoms soon became aggravated and developed into convulsions, at which time the dyspnea was extremely pronounced and accompanied by salivation, dilatation of the pupils, loss of reflexes, rigor and opisthotonos. The respiration was stertorous and decidedly costal in type, with absolutely no tendency toward abdominal breathing. The abdomen was flaccid and palpation revealed nothing more than what would be suggestive of a full digestive tract, with exception of the stomach (which seemed to occupy an abnormally large space) in which fluids and flatus could be detected.

The slightest pressure upon the abdomen and left side caused momentary suspension of the respiratory movements, which were immediately resumed on release of this pressure. The same pressure, when applied just posterior to the last rib on the left side, permitted eupnea; but the dyspnea was immediately reëstablished on release of this pressure. At this time, rupture of the diaphragm with dilatation of the stomach was suspected, but it was most difficult to reconcile such a diagnosis with the above in view of the fact that no trace of external violence was evident on the body. Neither could etiology of any nature be incriminated, since the dog had been confined in a securely fenced yard. Obviously, the pressure on the abdomen forced the viscera

through the ruptured diaphragm into the thoracic cavity, while the pressure applied with three fingers posterior to the last rib reduced the thoracic embarrassment by either retarding or blocking the further prolapse of the abdominal contents, or by causing a tendency to normal replacement, thus removing the pulmonary pressure.

The writer was of the opinion that surgical treatment in this particular case would be of no avail and euthanasia was advised, which coincided with the owner's wishes. Even if incomplete pulmonary ventilation, as a result of the compression and arhythmic respiratory frequency, resulting in an increase of the CO_2 concentration in the blood and thus paralysing the cardiac action, did not occur, surely shook or hemorrhage would have developed or progressed sufficiently to have caused death.

Euthanasia was performed in the client's home and the cadaver removed to the office for autopsy. The findings suggested an entirely different aspect of this case.

Postmortem

The autopsy was performed within 30 minutes after death, and for the sake of formality it is reiterated that there were no marks of violence or other indications of injury on the body. The aforementioned abdominal pustules had disappeared, but a soap-bubble-like froth ensued from the mouth. When the laparotomy was completed, the stomach bulged through the incision like a balloon, and was approximately six times its normal size, the walls of the same being as thin as paper. The anatomical layers of the stomach could not be differentiated macroscopically because of the attenuation of the structure of this viscus. If a toy balloon were filled with water, then palpated, the sensation would be analogous to that obtained by manipulation of this stomach. The gastric contents were a viscous gray mucus and flatus under pressure. The mucous membrane was ulcerated and hemorrhagic. The walls of the duodenum were extremely thick, the mucous membrane also ulcerated and hemorrhagic. The lumen of the pylorus was occluded to such an extent that the shaft of a grooved director could not be passed without force. This passage was probably permitted by postmortem relaxation and no doubt pyloric stenosis existed in life, which completely prevented or at least momentarily retarded the passage of the stomach contents into the intestinal tract. While it could within reason be expected, there was no evidence of icterus, either ante- or postmortem.

Another startling lesion was the condition of the entire length of the intestinal tract, which could be removed from the abdominal cavity *en masse*, the complete structure being so closely adherent that separation was possible only by dissection. The omentum and visceral peritoneum could not be readily differentiated. The liver was swollen and soft; parenchymatous degeneration being no more than what would be expected, considering the condition of the intestinal tract. Certainly some degree of prolonged intoxication existed at various times throughout the brief life of this individual. There was what appeared to be an occluding growth within the body of the uterus, just posterior to the bifurcation. It is doubtful, however, whether this obstruction was actually hyperplasia, even though it appeared as proliferation. Since induration was so extreme in this subject, it would appear more consistent in consideration of the age of this individual to consider this also as induration. However, there was insufficient evidence presented to warrant this conclusion, as it was not possible at the time of autopsy to make a histological study of the tissues involved. Surprisingly, no other appreciable changes occurred in the abdominal viscera, including the kidneys, which presented no describable macroscopic alterations. The visceral peritoneum was very thick, tough and fibrous, with several areas of parietal adhesions. The walls of the intestines were about ⅛ inch thick and indurated; they did not collapse after evisceration, but held their form like a rubber tube and would rupture when acutely flexed or firmly compressed.

The diaphragmatic rupture was approximately 1½ inches in length, the frayed edges being hemorrhagic. It was situated in a dorso-ventral plane, in the middle of the left side of the diaphragm. Portions of the stomach, liver and intestines had been forced into the thoracic cavity, displacing the lungs and heart and causing great compression. The thorax contained approximately half a teacup of blood. The right side of the diaphragm had previously been under terrific pressure to such an extent that the muscle fibers had been separated but not ruptured. There were two areas, involving the aponeurotic and muscular portions, in which the pleura and peritoneum formed the only barrier between the abdominal and thoracic cavities, these two areas being transparent. The thoracic viscera showed no alterations other than distortion and malposition. While a mechanical cardiac disturbance was evident, due to compression by the prolapsed abdominal viscera, no edema was discernible macroscopically, even though it was expected.

There was no evidence of parasitism, either clinically or at autopsy.

In an attempt at further study of this case, it was learned later that the dog, from birth, had been extremely nervous and readily excited. It had early developed a seemingly natural phobia toward strangers, animals and vehicles. Neurosis could possibly be a phase of this syndrome.

ANOTHER METHOD OF DEHORNING*

By LOUIS N. MORIN, *Clinton, Ill.*

Without having any intention of prolonging the discussion of methods of dehorning, but with the thought that I might add something constructive, I am sending you the following for publication if it meets with your approval.

Cut the horns close, making sure to include a "ring of skin." Pull any protruding vessels with artery forceps. Remove any loose pieces of bone and plug the holes with cotton soaked in an oily antiseptic. This latter measure is very effective in preventing contamination and as a protection against the elements.

SUCCESSFUL OPERATION TO CORRECT RECTAL PROLAPSE IN A CAT†

By LOUIS GOLDBERG, *Atlantic City, N. J.*

On September 18, 1937, a six-month-old female cat was brought to our clinic for treatment. The owner, who had picked the cat up on a roadway two weeks previously, stated that each action of the bowels produced a prolapse, which she returned by manipulation. The animal at the time of examination was emaciated and showed considerable pain, with a mucopurulent discharge from the irritated rectum and anus. After several attempts at replacement by local application of astringents and sutures, which were unsuccessful, an operation was decided upon.

The proper dose of nembutal was administered in capsule form as an anesthetic. An incision was made on the median line about 1½ inches in length and a spreader inserted. The rectum

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†Received for publication, November 22, 1937.

was located and slight traction applied, after which chromic catgut was tied around the mesenteric attachment of the rectum and sutured to the right abdominal wall. Ovariectomy was then performed, with the idea in mind that pregnancy might tear down any adhesions formed between the mesentery and the abdominal wall. The abdominal opening was closed with a single row of twisted silk ligatures, and a bandage applied.

The cat was kept quiet by applying a small amount of nembutal on the tongue daily and kept on a liquid diet for one week. The sutures were removed in six days.

The cat was discharged at the end of three weeks and, during the entire period since the operation, there was no evidence of a recurrence of prolapsed parts and the animal had regained its normal weight and condition.

LOCALIZED PULLORUM INFECTION IN THE OVARY OF A DUCK*

By F. R. BEAUDETTE, *New Brunswick, N. J.*
New Jersey Agricultural Experiment Station

Hinshaw and Hoffman[1] have recently reviewed all the known outbreak of pullorum disease in ducks and added a report of their own experience. In all of these cases, five in number, the disease attacked only ducklings and there was evidence that it was contracted from chicks.

The case to be reported here concerns a two-year-old Muscovy duck that died on October 15, 1937, and which was received the following day from West Orange, in Essex County. A letter stated that on October 8 a three-month-old duck died. Another of the same age died on the 9th and another on the 11th. On the 12th, a six-week-old duck died and also a two-year-old Rhode Island Red hen. The owner noted the ducks to be apparently healthy at 2:30 a. m. on the 15th when he returned from work, but at 9:30 a. m. the old duck which was sent was found dead. White, slimy droppings were noted. The owner added that he had 20 young pullets, 9 hens two years old, 3 six-week-old ducks and 4 three-month-old ducks left, and that the ducks and chickens are separated except when let out in the yard.

Autopsy showed a mottled liver, a necrotic area about 7 mm in diameter in the wall of the gizzard, and catarrhal duodenitis.

*Journal Series Paper of the New Jersey Agricultural Experiment Station, Department of Poultry Husbandry. Received for publication, December 3, 1937.

The spleen was normal. A caseous ovum about 1 mm in diameter was attached to the ovary by means of a thin stalk. A culture from the liver remained negative, but a pure growth was obtained from the caseated ovum. Unfortunately, no culture was taken from the necrotic area in the gizzard which resembled areas frequently seen in chicks affected with pullorum disease.

In preliminary tests, the organism produced acid and gas in dextrose, but not in lactose, maltose or saccharose. Later, other substances were tested with the following results. Acid and, after 96 hours, gas production in rhamnose, trehalose, mannitol, galactose and arabinose. Acid but no gas was produced in mannitol, even after 10 days. Acid was produced in glycerin after 96 hours, but no gas. Acid did not appear in levulose until after 48 hours and no gas was present at 10 days. Neither acid nor gas was produced in soluble starch, sorbite, salicin, inulin, adonitol, xylose, dextrin, melezitose, amygdalin, inosite, raffinose, erythritol and dulcitol.

These results are similar to those reported by Hinshaw and Hoffman except that xylose and sorbite were not fermented in my case. Delayed acid-production in glycerin is to be noted in both cases, but my strain promptly fermented aribinose, which was delayed according to Hinshaw and Hoffman.

Thus, the present case appears to be the first record of pullorum infection in an adult duck. On the basis of available information and on the assumption that the chickens and ducks died from the same cause, it is impossible to determine which species served as a source of infection. At any rate, the first losses were in ducks, that is, 3 three-month-old ducks died between October 8 and 12, and on the latter date, the two-year-old hen and a six-week-old duck. A final loss of a two-year-old duck occurred on the 15th.

REFERENCE

[1]Hinshaw, W. R., and Hoffman, H. A.: Pullorum disease in ducklings. Poultry Sci., xvi (1937), 3, pp. 189-193.

Regulating Butter Fat in Wisconsin

In Wisconsin, a milk dealer may get into trouble with the Department of Agriculture and Markets if he sells milk that exceeds the butter-fat content fixed by law. It is reported that there has been more convictions obtained by the state law-enforcing authorities against dealers for selling milk that was too rich in butter fat than there have been cases of dealers selling substandard milk.

THE INFLUENCE OF ALLERGY ON THE DEVELOPMENT OF EARLY TUBERCULOSIS LESIONS. L. Dienis and Tracy B. Mallory. Amer. Jour. Path., xiii (1937), p. 897.

In the guinea pig, with massive primary infections of the peritoneal cavity or testicles, reinfectious lesions were produced on successive days and the animals simultaneously skin-tested for tuberculin sensitivity. After the lapse of varying periods of time, the primary and reinfectious lesions and the tuberculin reactions were compared histologically. Under the conditions employed and within the limits of error of the method, it was found that the first appearance of significant numbers of large mononuclear cells and the development of detectable tuberculin sensitivity occurred simultaneously between the third and fourth days after the primary infection. The significance of these observations in relation to the authors' previously advanced hypothesis, that bacterial allergy is responsible for the early granulomatosis reaction of the host, is discussed.

CHANGES IN THE TEETH FOLLOWING PARATHYROIDECTOMY. I. The effects of different periods of survival, fasting, and repeated pregnancies and lactations on the incisor of the rat. I. Schour, S. B. Chandler and W. R. Tweedy. Amer. Jour. Path., xiii (1937), p. 945.

The effect of parathyroidectomy on the incisor of the albino rat was studied in 100 animals and 27 controls. The incisor of the parathyroidectomized rat shows disturbances in calcification and in development. The essential character of the reaction varies with the length of the survival period. In survivals up to 20 days, the postoperative dentin indicates denser calcification than normal and is demarcated from the preoperative dentin by a distinct ring. In longer survivals the changes consist of defective calcification and defective formation of enamel and dentin. The severity of the changes increases with the increase in time of survival. The histological changes are aggravated by

fasting every seventh day. The most severe alterations were found in animals that were subjected to repeated pregnancies and lactations. Histological examination shows no evidence of calcium withdrawal from the calcified tissues of the teeth.

CHANGES IN THE TEETH FOLLOWING PARATHYROIDECTOMY. II. The effect of parathyroid extract and calciferol on the incisor of the rat. I. Schour, W. R. Tweedy, S. B. Chandler and M. B. Engel. Amer. Jour. Path., xiii (1937), p. 971.

Twenty-nine rats parathyroidectomized between the ages of 21 and 93 days were given one to four injections of parathyroid extract, while 30 similarly operated rats received calciferol. The histological findings on the dentin of the incisors of these animals were similar in both groups. The authors conclude that massive doses of calciferol do not necessitate the presence of the parathyroids in order to exert their effects.

ANTIBACTERIAL IMMUNITY TO STAPHYLOCOCCUS PYOGENES. Champ Lyons. Brit. Jour. Exp. Path., xviii (1937), p. 411.

The capsule of staphylococcus is developed by toxigenic and non-toxigenic strains in young infusion broth cultures and has largely disappeared in older cultures. Growth in serum inhibits encapsulation. The capsule resists 100° C. for 5 minutes but can be removed by mechanical agitation. The encapsulated phase is resistant to phagocytosis but the non-encapsulated phase induced by growth in the serum component of defibrinated blood is susceptible to phagocytosis. The invasive stage is characterized by encapsulated staphylococci. In rabbits the anticapsular antibody appears to be the essential antibacterial antibody for the staphylococcus.

THE EFFECT OF INCREASED ANTIPNEUMOCOCCAL IMMUNITY ON THE INCEPTION OF EXPERIMENTAL LOBAR PNEUMONIA IN THE DOG. O. H. Robertson. Jour. Exp. Med., lxvi (1937), p. 705.

Since one or more attacks of pneumococcus lobar pneumonia experimentally induced in dogs failed to protect the animals against subsequent infection, an attempt was made to determine whether or not the dog's antipneumococcal immunity could be enhanced to the degree of complete resistance to the experimental disease. Dogs were passively immunized by the intravenous injection of large quantities of both unconcentrated antipneu-

mococcus horse serum and concentrated antibody solution and actively immunized by vaccination with killed and living cultures of pneumococcus. None of these procedures was found to result in constant protection against the pulmonary infection. The disease, however, was of brief duration, the lesions of limited extent and usually sterile within 24 hours. A combination of active and passive immunity produced no better results. It was only when immune bodies and leukocytes were implanted with the infecting dose that prevention of infection was secured with any degree of constancy.

AN EXPERIMENTAL STUDY OF PROTECTIVE INOCULATION WITH HEAT-KILLED TUBERCLE BACILLI. Eugene L. Opie and Jules Freund. Jour. Exp. Med., lxvi (1937), p. 761.

Heat-killed tubercle bacilli repeatedly injected into or underneath the skin of rabbits increase conspicuously their resistance against infection with virulent tubercle bacilli. Protection against tuberculous infection following the administration of heat-killed tubercle bacilli to rabbits is only slightly less than that given by *B.C.G.* Addition of certain antigens, notably heated horse serum, increases the protection given by heat-killed tubercle bacilli so that it is approximately the same as that afforded by *B.C.G.* These experiments indicate that heat-killed tubercle bacilli may be substituted for the living attenuated microörganisms in an attempt to increase resistance against tuberculous infection and to influence favorably the delicate balance between asymptomatic or latent infection and progressive manifest disease that is characteristic of human tuberculosis.

BRUCELLA ABORTUS IN THE HORSE. Hugh McKenzie Duff. Jour. Comp. Path. & Therap., l (1937), p. 151.

Bacteriological examination of samples of abscess contents from horses revealed that 80 per cent contained *Brucella abortus.* Eighty-two per cent of fistulous withers samples, 50 per cent of the poll-evil samples and 100 per cent affected with both harbored *Br. abortus.* Eighty-five samples were examined. Ninety-two per cent of these horses had been in contact with cattle. Seveny-five per cent of the blood sera from horses affected with fistulous withers, poll-evil or both gave titres varying between 1:40 and 1:320. Eighty-seven per cent of these horses had been in contact with cattle. Seventy-one per cent of 95 animals affected with fistulous withers, poll-evil or both were reported to

have recovered as a result of inoculation with a *Br. abortus* dead vaccine, with or without operation.

TYPES OF TUBERCLE BACILLI IN EQUINE TUBERCULOSIS. A. Stanley Griffith. Jour. Comp. Path. & Therap., l (1937), p. 159.

A total of 55 cases of equine tuberculosis were investigated bacteriologically in England. The tubercle bacilli cultivated from these cases belonged to the bovine type in all but two instances, one being the human type and the other the avian type. The bovine strains all exhibited the cultural characters of the more dysgonic members of the bovine types and rather more than half of them were fully virulent for the test animals. The rest were less virulent than standard bovine bacilli for all the species of animals tested, the degree of attenuation varying from slight to considerable.

STAPHYLOCOCCUS ANTITOXIN IN THE BLOOD AND MILK OF COWS AND OTHER ANIMALS. F. C. Minett. Jour. Comp. Path. & Therap., l (1937), p. 173.

There is a distinct relationship between the age of the animal (cattle and goats) and the staphylococcus antitoxin titre of its blood. The presence of the antitoxin in the blood of cows is determined in part by infection of the udder with *Staphylococcus aureus*. The incidence of *Staph. aureus* infection in the udder increases with age. In cows and sheep, injections of staphylococcus toxoid lead to an increased concentration of antitoxin in the blood and this is reflected at times by an increase of antitoxin in the milk. Staphylococcus toxin can be demonstrated in the udder secretion of acute cases of staphylococcus mastitis. In the milk whey from normal quarters, the amount of antitoxin present is usually 1/80 to 1/40 of that in the blood-serum, whereas in colostrum the quantity of antitoxin may equal to or even exceed that present in the blood. When inflammation exists in the quarter, the amount of staphylococcus antitoxin in the whey rises. These data have a bearing on the source of antitoxin in the blood and antibodies in the milk.

HEMORRHAGIC ENTERITIS IN TURKEYS. B. S. Pomeroy and R. Fenstermacher. Poultry Sci., xvi (1937), p. 378.

Hemorrhagic enteritis in turkeys was observed and studied in 35 birds, 7 to 12 weeks of age. The birds appeared well nour-

ished. Hemorrhagic enteritis particularly of the duodenum was the most pronounced macroscopic lesion. The villi often become distended and appear club-shaped. *Escherichia coli* was isolated from the heart and liver of a few birds. One of two rabbits and one of four guinea pigs inoculated subcutaneously with macerated organs of affected turkeys died, *E. coli communis* being isolated at autopsy. A rabbit and a guinea pig, inoculated subcutaneously with a suspension of a Gram-positive organism isolated from a few affected turkeys, died in one to 15 days, respectively, *E. coli* being isolated. The blood-sera of a number of turkeys injected with organ suspensions, unfiltered intestinal contents, and intestinal content filtrates and fed macerated organs were negative to a number of paratyphoid organisms. The conclusion is reached that the organisms isolated may be of secondary but not primary importance in the development of the condition observed.

THE EFFECT OF IRITIS OF BREEDING HENS ON THEIR PROGENY. D. E. Madsen. Poultry Sci., xvi (1937), p. 393.

Opportunity to study the possible danger involved in the use of breeding hens affected with iritis was provided when the Utah Agricultural Experiment Station flock developed a rather high percentage of iritis cases. A total of approximately 1,100 birds were involved in the study. The incidence was higher in some pens than in others. The progeny of 53 hens showing iritis and three showing "indistinct" eyes were mated with normal males. Fifteen of 37 cockerels at three months of age showed "indistinct" characteristics. Of 27 pullets raised to maturity, one showed "indistinct" eyes and three showed this characteristic inconsistently. Seventy birds from the second generation were observed until 10 to 13 months of age. Only one bird developed an "indistinct" eye; no iritis occurred. The study indicates that iritis-affected hens are not necessarily progenerators of lymphomatosis in their progeny; there is evidence to show that the reverse is true.

STUDIES ON INCUBATOR HYGIENE. IX. The disinfecting properties of formaldehyde for hemophilic bacteria associated with avian coryza, the filtrable viruses of infectious laryngotracheitis and infectious bronchitis. Robert Graham and C. A. Brandly. Poultry Sci., xv (1937), p. 428.

Two hemophilic bacteria associated with avian coryza, two strains of laryngotracheitis virus and one strain of bronchitis

virus were exposed to formalin in amounts of 16 2/3 cc per 100 cubic feet in a forced-draft incubator with relative humidity of approximately 68 per cent. The hemophilic bacteria were non-viable after 60 minutes in five fumigation tests. Laryngotracheitis virus in aqueous and broth suspensions was non-viable after 30 minutes in one fumigation, while the dried finely powdered virus was viable in two fumigations after 90 minutes. Avian bronchitis virus in dried finely powdered form was non-viable after fumigation for 60 minutes. The authors conclude that the procedure in previous recommendations regarding disinfection of incubators to control pullorum disease is also effective in controlling the causal agents of respiratory infections. Emphasis is placed upon thorough cleaning.

AGGLUTININ CONTENT OF EGGS FROM SALMONELLA PULLORUM-INFECTED HENS. Norma A. Frank and B. H. Edgington. Poultry Sci., xvi (1937), p. 442.

Yolk and albumin from 495 eggs from 21 hens whose blood had *Salmonella pullorum* titres ranging from incomplete at 1:50 to partial at 1:1,600 were tested by the stained-antigen-plate method. Agglutinins were demonstrated in the yolks of each egg but in no instances in the albumin. Complete agglutination of the antigen occurred regularly with yolk material from eggs produced by six pullorum-positive hens. Eggs from the other hens gave reactions that varied from complete to a mere trace of agglutination. Ninety-two eggs were cultured for *S. pullorum* with negative results. Blood from each of the 21 hens at autopsy gave complete agglutinations in the whole-blood-plate tests. *S. pullorum* was isolated from ova of 20 of the 21 hens. Material obtained at autopsy from apparently normal but incompletely developed ova gave complete agglutination with yolk from 18 of the hens and incomplete with that from three birds. Agglutination of the antigen usually was most rapid and the clumps largest with material from the high-titre birds.

A Lot of Leather

A large manufacturer of shoes recently purchased 100,000 cow hides from a group of Chicago packing companies at ¼ to ½ cent a pound above the previously prevailing prices. It was the largest single purchase since last summer and suggested a strong market for hides during the next few months.

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Kansas Veterinary Medical Association, Proceedings of the. 1937. pp. 89. Dr. C. W. Bower, Secretary, Topeka, Kan.

Bureau of Animal Industry, Report of the Chief. (Washington, D. C., 1937. pp. 64. Price 10c.)

Michigan State College and Applied Science. Division of Veterinary Science, 1936-1937, Report of the. (East Lansing, Mich., 1937. pp. 36.)

Diseases of Upland Game Birds. (Farmers' Bul. 1781. U. S. Dept. Agr., Washington, D. C., Aug., 1937. pp. 34.. Illus. Price 5c.)

Los Angeles County Health Department, Bureau of Laboratories, 1936-1937, Annual Report. R. V. Stone, Director. pp. 36.

Regular Army

Captain Wm. E. Jennings is detailed as a student under the provisions of Sec. 127a National Defense Act, as amended, and directed to proceed to Lexington, Ky., for temporary duty for a period of approximately five months, effective on or about January 1, 1938, for the purpose of pursuing a course of instruction in the science of breeding and clinics under Dr. Dimock at the University of Kentucky; upon completion to return to his proper station, Washington, D. C. Captain Jennings is also directed to report in person to the officer in charge of the Lexington Remount Area, Lexington, Ky., for additional duty.

1st Lieut. Edwin L. Millenbruck, Army Medical Center, Washington, D. C., is directed to proceed to Carlisle Barracks, Pa., and report to the Commandant, Medical Field Service School, on or about January 1, 1938, for temporary duty for a period of approximately five months, for the purpose of pursuing the basic course of instruction.

Captain Robert A. Boyce, Jr., is directed to proceed at the proper time from Washington, D. C., to Fort George G. Meade, Md., and report on or about January 3, 1938, to the commanding officer for temporary duty for a period of approximately five months; upon completion of this duty to return to his proper station.

1st Lieut. Fred L. Herring is relieved from further assignment and duty at the United States Military Academy, West Point, N. Y., is assigned to duty at the Medical Field Service School, Carlisle Barracks, Pa., and will proceed to Carlisle Barracks, Pa., and report, on or about January 1, 1938, to the Commandant, Medical Field Service School, for duty for the purpose of pursuing the basic course of instruction.

Captain James B. Nichols is relieved from duty at Fort Myer, Va., and assigned to the San Francisco port of embarkation, Fort Mason, Calif., and will proceed at the proper time to New York, N. Y., and sail on the transport scheduled to leave that port on or about November 27, 1937, for San Francisco, Calif.; upon arrival in San Francisco will report to the commanding general, San Francisco port of embarkation, for duty.

Lt. Col. Francois H. K. Reynolds is relieved from his present duties in the Panama Canal Department and is assigned to duty with the Medical Department Research Board, effective upon the relief of Lt. Col. Raymond A. Kelser. Lt. Col. Reynolds will report to the commanding general, Panama Canal Department, for duty accordingly and to the Governor, the Panama Canal Department, for additionl duty with the Research Board.

The promotion of Major George J. Rife to the grade of lieutenant colonel, with rank from November 27, 1937, is announced.

The promotion of 1st Lieut. Albert A. Roby, Jr., to the grade of captain, with rank from November 17, 1937, is announced.

The following-named veterinary officers of the National Guard have been enrolled in the Forage Inspection Course at the Army Veterinary School, Army Medical Center, Washington, D. C., beginning November 29, 1937:

Captain Hubert H. Harz, V. C., 122nd F. A., Illinois N. G.
Captain Walter W. Arzberger, V. C., Wisconsin N. G.
Captain Robert S. MacKellar, V. C., 101st Cav., New York N. G.
Captain William M. Lukens, V. C., 112th F. A., New Jersey N. G.
1st Lieut. Thomas A. Ward, V. C., 124th Cav., Texas N. G.

Lt. Col. Raymond A. Kelser is assigned to duty in the office of The Surgeon General, Washington, D. C., effective upon completion of his present tour of foreign service in the Panama Canal Department.

Captain Clarence L. Taylor is relieved from assignment and duty at the Army Medical Center, Washington, D. C., effective upon completion of his course of instruction at the Army Veterinary School, on or about January 1, 1938, and assigned to Fort Myer, Va., for duty.

Captain Wayne O. Kester is relieved from assignment and duty at the Army Medical Center, Washington, D. C., effective upon completion of his course of instruction at the Army Veterinary School, and is assigned to duty at the Seattle Quartermaster Depot, Seattle, Wash., and will proceed at the proper time to New York, N. Y., and sail on the transport scheduled to leave that port on or about January 6, 1938, for San Francisco, Calif. Upon arrival in San Francisco will proceed to Seattle for duty.

Veterinary Corps Reserve

NEW ACCEPTANCES

Pinckard, Wendell Lamar....1st Lt...312 Church St., Knoxville, Tenn.
Reneau, John Bryant Jr.....1st Lt...Munday, Texas.

PROMOTIONS

To

Davidson, J. LaVere.....Capt...2226 Oakland Drive, Kalamazoo, Mich.
Todd, Frank Arnold.....Capt...98 Park St., New Haven, Conn.
Brillhart, Carl Edgar.....1st Lt...722 State Office Bldg., Lansing, Mich.
Mencimer, Floyd Robert.....1st Lt...4100 Riverdale Road, Ogden, Utah.

NEW ASSIGNMENTS TO ACTIVE DUTY WITH CCC

Parker, R. M.....1st Lt...Fort Moultrie, S. C.
Theopilus, D. K.....1st Lt...Hq. 4th Corps Area.
Fry, Lloyd Vern.....1st Lt...Fort Snelling, Minn.
Willard, Horace Randolph....1st Lt...North Texas Dist. CCC, Fort Worth, Tex.

TERMINATION OF ASSIGNMENT TO ACTIVE DUTY WITH CCC

Greene, James E.....1st Lt...Fort McPherson, Ga.
McNay, Garrett H.....1st Lt...Fort Moultrie, S. C.
Yost, Hursh R.....Capt...Fort Knox Dist., Ft. Knox, Ky.
Scheetz, George F.....1st Lt...Charleston Dist., Charleston, W. Va.
Reineccius, Jake Louis.....1st Lt...Fort Des Moines, Ia.
Nieberding, Joseph F.....1st Lt...North Texas Dist. CCC, Fort Worth, Tex.
Asbill, Stephen G.....1st Lt...Sacramento, Calif.
Bolenbaker, R. F.....Capt...Fresno, Calif.
Bolender, Fred J.....1st Lt...Fort Missoula, Mont.
Hensley, John H.....1st Lt...Boise, Idaho.
Mace, Don L.....1st Lt...Redding, Calif.
Morgan, Donald R.....1st Lt...Vancouver, Wash.

Report of Special Committee on Advertising

A. E. CAMERON, *Chairman*
J. C. FLYNN H. C. H. KERNKAMP

When a man exercises a special craft and serves the public on his own account the public can look only to the organized profession to see that a high standard of reputable conduct is maintained.

An association must exercise moral force when it has no legal means of disciplining its members.

It is necessary to separate clearly publicity from personal advertising, as it is believed that the profession is in need of all legitimate publicity, but on the other hand personal advertising in any form must be considered as "disgraceful conduct" in a professional respect.

The subject is complex in a general way and your committee feels it is difficult to specify what is or is not legitimate without reference to specific cases.

There is difficulty in defining "disgraceful conduct" in a professional sense but there are general principles which may be accepted:

(1) Testimonials should not be given for proprietary remedies and veterinarians should see that their names are dissociated from proprietary lines.

(2) Sign-boards may be large enough to indicate the whereabouts of a veterinarian if someone is seeking him. Anything beyond that is in the nature of advertising. Signs other than at a residence or place of business would nearly always be classed as advertising. When sign-boards are large, they are more like a trade than a profession.

(3) Anything designed to get a practitioner more patients or for a practitioner's own personal advantage may be accepted as advertising. For example, broadcasting under one's own name is questionable and broadcasting should usually be under the auspices of an association of some sort.

(4) The general principles recommended for acceptance in advertising of veterinary commodities are a true and correct description of the article or product without exaggeration, which is only too common.

(5) The veterinarian should be encouraged to be active in public affairs, as this tends to establish his position in the community and there is no objection to taking advantage of opportunities to advise the public of the advancement being made in veterinary science in general.

(6) The association might well encourage members to aid in educating the public by assisting with scientific exhibits at suitable gatherings.

Your committee is not prepared to codify all possible infringements of professional etiquette, but feels the association should be liberal in

gradually tightening its requirements. Specific cases would have to be considered as they arise, keeping in mind the principle that drastic measures should be resorted to only when persuasive and educational efforts have failed.

Your committee is strongly of the opinion that the most effective way to prevent unprofessional conduct and illegitimate advertising is to have special lectures on the subject in the veterinary curriculum of all veterinary colleges. These could be included in the course on veterinary jurisprudence.

Murals to Grace Court of Veterinary Building at Iowa State College

Writing in the *Iowa State Student*, Max Harrington recently reported the progress being made in the rejuvenation of some of the architectural features of the courtyard of the main veterinary building on the campus of Iowa State College. Mr. Christian Petersen, sculptor in the Applied Arts Department, is carrying out some ideas conceived by the late Dr. C. H. Stange for modernizing and beautifying the courtyard. But read Mr. Harrington's story:

One of the few remaining vestiges of the horse and buggy days disappeared last week when a building and grounds crew attacked the old concrete horse trough in the old veterinary quadrangle with sledge hammers and diamond-point drills. This was the first step in landscaping the court.

Central features of the rejuvenation of the court, which has served as a service yard ever since its construction, will be a statue, gravel drives interlacing flower beds and plantings, and a ceramic mural.

The court when completed will be a far cry from Dobbin's drinking fountain. Considerable sentiment among the veterinarians, faculty and students alike, accompanies the removal of their landmark.

The mural will make its public debut sometime in January, but the statue and the graveled drives will not be completed until spring, according to Christian Petersen, of the Applied Arts Department.

Iowa State's resourceful artist, Mr. Petersen, whose interests lie in helping make this campus the most beautiful in the country, creates from ordinary things admirable pictures well within the concept of the layman, rather than grotesque creations that take an artistic turn of mind to interpret.

This statue, Petersen's latest "art child," which will stand in the center of the court, expresses the sentiment and feeling of a typical veterinary student as he goes about his daily work of administering to animals.

Beside the student a dog sits with his head uplifted and nestled in the folds of his clinic coat. Almost hidden in the sleeves of the student's folded arm is a sick puppy which he gently strokes as he looks down into the questioning eyes of a trusting female parent.

On the west wall, where the watering trough stood, will be the ceramic mural, another Christian Petersen creation. This picture won considerable recognition for him at the State Fair art exhibits last fall.

This mural, an attractive arrangement of animal and human characters, finished in terra cotta, depicts the relationship existing between

veterinarian and human medicine. It is a composite grouping depicting five phases of veterinary work.

At the extreme left, on the south, a doctor, with the help of another, is examining the throat and mouth of a cow. To the right of these figures two men hold a calf. Its stomach has been shaven for the purpose of developing pox for smallpox vaccine to be used for vaccinating humans for the disease.

Above and behind, a horse, which has previously been injected with diphtheria germs, is being subjected to a blood "effusion." In practice this blood is then "cultured" and the serum used for the treatment of the disease in man.

Similarly, this theme is carried throughout the entire scene, tying together the curing and prevention of human diseases with the laboratory work with four-legged benefactors by veterinarians.

Just behind the horse is a hog being inoculated for hog cholera. Above and to the right, is an operating-table upon which lies a dog. Serum is being drawn from the base of the brain of the animal to treat human patients for rabies.

Acid Hog-Cholera Virus

The Biochemic Division of the U. S. Bureau of Animal Industry has been conducting studies on various factors affecting the retention of virulence by commercial hog-cholera virus. Some progress already has been made in studies on the influence of hydrogen-ion concentration.

A survey of commercial simultaneous virus showed that its hydrogen-ion concentration seldom falls outside the range pH 7.0 to 7.4. Samples of defibrinated virulent blood, preserved with either 0.5 per cent of phenol or 40 per cent of glycerin, were adjusted by the addition of acid or alkali to cover the range pH 3 to 9 and were stored at about 25° C. Periodical tests were made on susceptible pigs in order to determine when virulence had vanished. The results pointed to pH 5.0 to 5.5, representing a slightly acid medium, as optimal for the preservation of virulence. Under these conditions virulence appeared to persist three times as long as at pH 7.0.

Unfortunately, the improvement cannot be directly applied to ordinary simultaneous virus because the mixture becomes too thick. Preliminary experiments indicate that the difficulty probably may be overcome by the incorporation of a moderate proportion of glycerin. Application has been made for a public patent covering acid hog-cholera virus, according to the 1937 report of the Bureau of Animal Industry.

The illusion that times that were are better than those that are, has probably pervaded all ages.—*Greeley.*

PURDUE UNIVERSITY VETERINARY SHORT COURSE

The annual Purdue University Veterinary Short Course was held October 19-22, 1937. The daily attendance was the largest in years.

Poultry diseases were discussed by Drs. L. P. Doyle, F. C. Tucker and S. E. Bowman, and the selection and management of the poultry flock by Prof. C. W. Carrick. Fowl paralysis, tumors and pullorum disease, their importance and control, were the principal diseases discussed. Dr. Tucker stated that hatcherymen and veterinarians, who are willing to coöperate in a plan to furnish the buying public with healthy, livable chicks, are necessary to the control of chick diseases. Prof. Carrick emphasized the relation of hereditary factors to egg-production.

The second day of the short course, the program included discussions on the control of hog diseases and death-rate in new-born pigs, by Drs. R. A. Craig and L. P. Doyle. The lesions of hog cholera, conditions which influence the post-vaccination death-rate and the importance of large doses of serum were discussed. Dr. Doyle emphasized the relation of feeding and management of the sow during gestation to the death-rate at birth, and protecting the litter against anemia and infectious diseases. Prof. W. W. Smith brought into the arena representative groups of several breeds of hogs, and discussed the breeding plan followed in building the herd, and the qualities of the individuals and breeds represented. In the group were mothers of grand champion barrows of the International Live Stock Exposition.

Thursday morning, Dr. J. F. Bullard discussed breeding problems and demonstrated artificial insemination in cattle. Lectures by Drs. E. E. VanLone and S. H. Hauge followed. Dr. VanLone discussed factors of heredity and Dr. Hauge spoke on minerals in nutrition. In the afternoon, Drs. H. Busman and J. L. Axby, of Indianapolis, and Dr. H. Preston Hoskins, of Chicago, addressed the veterinarians. Dr. Busman discussed progress in

the control of Bang's disease and Dr. Axby explained Regulation 25, which relates to the sale and distribution of milk. Dr. Hoskins discussed the trend of veterinary student enrollment in colleges; the increasing importance of veterinary service in public health work, and the status of contract practice under the federal rehabilitation program.

Sixty veterinarians were present at the dinner meeting which was held in the faculty lounge of the Memorial Union Building. Dr. J. L. Axby presided and called on several present for short addresses. Following the dinner, a motion picture of wound healing was shown.

Large- and small-animal clinics were held the last day of the course. Dr. W. B. Craig, of Indianapolis, had charge of the large-animal clinic and Dr. G. L. Ebright, of Hammond, of the small-animal clinic. Dr. Craig was assisted by Drs. J. F. Bullard, C. C. Donelson and C. W. Fisher. Dr. C. L. Miller, of Oak Park, Ill., assisted Dr. Ebright. Both clinics were held simultaneously and the interest and attendance were better than at any previous clinic. Veterinarians were especially interested in animal restraint which was demonstrated by Dr. Fisher.

R. A. CRAIG, *Reporter.*

DR. C. C. DONELSON, OF INDIANAPOLIS, AND DR. PAUL F. SCOTT, OF NEW MARKET, IND., ASSISTING, OPERATING ON A HORSE FOR THE REMOVAL OF A TUMOR, AT THE PURDUE UNIVERSITY VETERINARY SHORT COURSE, OCTOBER 19-22, 1937.

VETERINARY MEDICAL ASSOCIATION OF NEW YORK CITY

The regular meeting of the Veterinary Medical Association of New York City, was held on Wednesday evening, November 3, 1937, at the Hotel New Yorker.

President R. S. MacKellar, Jr., introduced our guest speaker, Dr. Raymond High, of Philadelphia, Pa., who gave us a very interesting talk on Novidal, which is a new preparation of iodine in oil. According to Dr. High, this preparation has many advantages over straight iodine in that it is stable to light and does not deteriorate, but when exposed to the tissues the iodine is liberated freely. It may be used both externally and internally.

Dr. Gerry B. Schnelle, of Boston, Mass., our next speaker, presented an illustrated lecture on radiology of soft tissues, including lungs, kidneys, intestinal tract and bladder. In fact, the presentation covered the entire body. This was particularly interesting to those used to taking x-rays, as Dr. Schnelle brought out many interesting facts, mostly in connection with technic and the interpretation of plates. He also displayed some very fine x-ray plates which very definitely illustrated points he brought out in his talk.

J. B. ENGLE, *Secretary.*

WEST VIRGINIA VETERINARY MEDICAL ASSOCIATION

The annual meeting of the West Virginia Veterinary Medical Association was held at the Fairmont Hotel, Fairmont, October 25-26, 1937. The session held on the second day was a joint meeting with the West Virginia Dairy Association.

Following a business session, the literary program was opened with a report on the progress of work on Bang's disease and tuberculosis in West Virginia, by Dr. H. M. Newton, U. S. B. A. I. Inspector-in-Charge. Dr. W. R. Krill, of Ohio State University, then presented "Diseases of the Digestive Tract of Ruminants." The discussion was led by Dr. S. E. Hershey, of Charleston.

At the afternoon session, Capt. L. L. Bechtol, Veterinary Reserve Corps, stationed at Nutter Fort, discussed "The CCC and Its Veterinary Service." Dr. E. N. Moore, of Morgantown, then gave a résumé of research work on mastitis. Dr. Krill

gave his second talk of the day on "Dystokia in Mares." Dr. C. W. Groppe, of Wheeling, spoke on "City and County Milk Inspection."

Dr. G. W. Stephens, of Blacksville, reported on some interesting cases that he had encountered in practice. Dr. W. E. Trussell, of Charles Town, explained methods of testing the saliva of race horses. Dr. P. M. Cellar, of Charleston, described methods of preparing specimens for laboratory diagnosis.

At the banquet, Hon. J. B. McLaughlin, Commissioner of Agriculture, discussed the agricultural and live stock situation in West Virginia. Prof. E. A. Livesay, of West Virginia University, Morgantown, spoke on "Breeding Horses for Usefulness."

At the joint meeting, Dr. Charles H. Kick, chemist in animal nutrition at Ohio State University, discussed and exhibited moving pictures of digestion in the rumen of cattle. Dr. Hershey showed his moving picture on rabies, and Prof. Brownell gave an interesting lecture entitled, "Basing Breeding on Facts."

J. H. RIETZ, *Secretary.*

Examination for Veterinary Meat Inspector

The California State Personnel Board announces an examination for a

VETERINARY MEAT INSPECTOR

to obtain eligibles to certify to several positions now filled by temporary employés; and to establish an eligible list from which to fill future vacancies.

The age limits are 21 to 50 years. Graduates of recognized veterinary colleges are eligible. Experience in meat inspection or live stock disease control work is an additional desirable qualification. All applicants must be full United States citizens.

Examinations will be held at San Francisco, Los Angeles, San Diego, Sacramento, and such cities outside the state of California as the number and location of candidates warrant, on February 11, 1938. Applications must be made out on official application blanks, procurable in Sacramento, at 1025 P Street; in San Francisco, at 108 State Building, in Los Angeles, at 401 State Building; at the San Diego Civil Service Commission, Library Annex, 9th and E Streets, or by writing to any of these offices.

Because of an urgent need for men qualified to perform this type of work and a lack of such men in California, the usual residential requirements have been waived. Applications should be filed on or before February 4, 1938.

NECROLOGY

ROY WILLIAM MASSEY

Dr. Roy W. Massey, of Santa Barbara, Calif., died on March 6, 1937, after a protracted illness.

Born at Alvarado, Texas, June 21, 1899, Dr. Massey was graduated from the San Francisco Veterinary College in 1916.

Dr. Massey joined the A. V. M. A. in 1925. He was a member of the California State Veterinary Medical Association and the Southern California Veterinary Medical Association.

OLIVER W. BYRD

Dr. Oliver W. Byrd, of Kansas City, Mo., died March 30, 1937, at the age of 83 years. He was a graduate of the Kansas City Veterinary College, class of 1909, and had spent practically all of his professional career in the service of the U. S. Bureau of Animal Industry. He retired from the service 13 years ago. He is survived by his widow, two daughters and one sister.

A. T. K.

ELMER C. EISENHOWER

Dr. Elmer C. Eisenhower, of Navarre, Kan., died on September 5, 1937.

Born at Enterprise, Kan., on June 21, 1884, Dr. Eisenhower attended public schools and the Kansas City Veterinary College. Following his graduation in 1910, he practiced at Gypsum, Kan., later going to Navarre.

Dr. Eisenhower joined the A. V. M. A. in 1910. He is survived by his mother.

HORACE I. KINGERY

Dr. Horace I. Kingery, of Greentown, Ind., died on October 13, 1937, at the age of 55 years. He was a graduate of the Indiana Veterinary College, class of 1909, and had been in prac-

tice at Greentown for 28 years. He is survived by his widow, one daughter, five brothers and four sisters.

GUY EDGECOMB

Dr. Guy Edgecomb, of Omaha, Neb., died on September 14, 1937, following a cerebral hemorrhage.

Born in Morris County, Kan., April 1, 1883, Dr. Edgecomb studied veterinary medicine at the Kansas City Veterinary College. Following his graduation in 1908, he entered the service of the U. S. Bureau of Animal Industry and remained in the service until his retirement, March 31, 1937. During this service he was stationed at various points in Kansas and Nebraska.

Dr. Edgecomb joined the A. V. M. A. in 1918. He was a member of the Masonic Lodge of Omaha. He is survived by his widow and a niece.

EMIL POHL

Dr. Emil Pohl, of Buffalo, N. Y., died October 24, 1937.

Born in Melbourne, Australia, January 12, 1863, Dr. Pohl came to the United States as a youth and studied veterinary medicine at the Ohio Veterinary College, Cincinnati. He was graduated with the class of 1891. Fifteen years later, he entered the service of the U. S. Bureau of Animal Industry and, except for a period of about three months during 1916, he served continuously until his retirement on December 31, 1929. He was stationed at Buffalo, N. Y., during the entire period of his service with the Bureau, and at the time of his retirement was an assistant veterinarian on meat inspection.

Dr. Pohl joined the A. V. M. A. in 1918. He is survived by his widow, two sons and two sisters.

ROY L. WOLFE

Dr. Roy L. Wolfe, of Tonganoxie, Kan., died on October 4, 1937, as the result of a sudden attack of heart disease. He was a graduate of the Kansas City Veterinary College, class of 1916, and had been in general practice at Tonganoxie until recently, when he accepted a temporary appointment with the U. S. Bureau of Animal Industry, on the force of Dr. N. L. Townsend, at Topeka.

GEORGE IRELAND

Dr. George Ireland, of Victoria, Texas, died November 16, 1937. He was a graduate of the Ontario Veterinary College, class of 1895, and had been engaged in general practice at Victoria.

EDWIN B. BEALS

Dr. Edwin B. Beals, of Greene, Maine, died at his home on October 22, 1937, following a short illness.

Born in Greene, Maine, on May 13, 1881, Dr. Beals attended Monmouth Academy and the Ontario Veterinary College. He was graduated in 1919 and had been in state employ as a cattle inspector, engaged in tuberculosis eradication work.

Dr. Beals joined the A. V. M. A. in 1920. He was a member of the Maine Veterinary Medical Association. He is survived by his widow, a sister and a brother.

ROBERT WILSON WHITEHEAD

Dr. Robert W. Whitehead, who was believed to have been the oldest graduate veterinarian in Ohio, died at his home in Youngstown, November 26, 1937, following an illness of three weeks.

A native of Scotland, Dr. Whitehead while still a young man immigrated to Canada and studied veterinary medicine at the Ontario Veterinary College. He was graduated with the class of 1874, and located in Youngstown a few years later. He was actively engaged in general practice there until his retirement about 15 years ago.

RALPH A. MOYE

Dr. Ralph A. Moye, of Manchester, Iowa, died on November 23, 1937, as the result of an accidental gunshot wound.

Born at East Las Vegas, N. Mex., January 3, 1889, Dr. Moye received a high school education before entering Iowa State College. Shortly after his graduation in 1917, he was commissioned in the Veterinary Corps of the Army as a second lieutenant and reported for duty at Camp Dodge, Iowa. He was assigned to the 313th Mobile Veterinary Section, 88th Division. On April 8, 1918, he was promoted to first lieutenant. On May 21, 1918, he was ordered to Camp Sherman, Ohio, as Camp Veterinarian, and was promoted to the rank of captain

a few days later. He was discharged on March 13, 1919, and located at Manson, Iowa, for general practice. A short time later, he removed to Manchester, and for about 15 years had been in state employ.

Dr. Moye joined the A. V. M. A. in 1918. He is survived by his widow, one son, one daughter and several brothers, one of whom is Dr. Kenneth J. Moye (K. C. V. C. '14), of Cabool, Mo.

CYREN BURDICK ESTEY

Dr. Cyren B. Estey, of Saint Cloud, Minnesota, died at his home on November 20, 1937, after a protracted illness.

Born at Watab, Minn., on August 3, 1878, Dr. Estey had his early schooling at Watab and at Sauk Rapids. He then decided to study veterinary medicine and entered the Ontario Veterinary College. He was graduated in 1905 and then took a year at the McKillip Veterinary College, in Chicago. He then located in Saint Cloud, where he practiced his profession for 31 years.

Dr. Estey joined the A. V. M. A. in 1907. He was a past-president of the Central Minnesota Veterinary Medical Association. He was also quite active in Masonic circles. Surviving Dr. Estey are his widow (née Emma Becker), two daughters, one son, two brothers and one sister.

J. P. F.

JAMES NELSON REYNOLDS

Dr. James N. Reynolds died at his home in Columbia Falls, Montana, on December 1, 1937. Born July 22, 1871, at Shakopee, Minnesota, Dr. Reynolds was a graduate of the Kansas City Veterinary College, class of 1911, and practiced veterinary medicine at Columbia Falls from that time until his death. He was a member of the Montana Veterinary Medical Association, serving as its vice-president in 1935. His son, Kenneth Reynolds, is a resident of Kalispell, Montana.

H. M.

JOHN L. BONE

Dr. John L. Bone, of Bethany, Ill., died suddenly at his home on December 12, 1937. He had suffered a stroke of apoplexy and lived for only a few minutes.

Born near Bethany, November 26, 1865, Dr. Bone had spent his entire life in that vicinity. He was a graduate of the

Chicago Veterinary College, class of 1891. He leaves one son, two daughters, two sisters and one brother.

CHARLES BEVERLY

Dr. Charles Beverly, of Chicago, Ill., died December 9, 1937, a little over a month after his retirement from the service of the U. S. Bureau of Animal Industry because of total disability.

Born at Springfield, Ill., September 27, 1885, Dr. Beverly received a grade and high school education before entering the Cincinnati Veterinary College. He was graduated from the latter institution in 1906. On January 3, 1927, he entered the service of the U. S. Bureau of Animal Industry and during his period of service was stationed at Brooklyn, N. Y., Chicago, Ill., Fostoria, Ohio, and Detroit, Mich., the last mentioned having been his official station at the time of his retirement.

Dr. Beverly joined the A. V. M. A. in 1929. He was a member of the National Association of Bureau of Animal Industry Veterinarians. He is survived by his mother.

HENRY HELL

Dr. Henry Hell, of Wilton Junction, Iowa, died suddenly at his home, December 17, 1937. He was stricken with a heart attack as he was retiring and died almost instantly.

Born in Scott County, Iowa, November 27, 1877, Dr. Hell attended local schools and then entered Iowa State College for the study of veterinary medicine. He did not complete the course at Ames, but transferred to the University of Pennsylvania, where he received his degree in 1904. He entered practice at New Liberty, Iowa, remained there about 15 years and then moved to Wilton Junction where he had resided ever since.

Dr. Hell joined the A. V. M. A. in 1927. He attended the meeting in Omaha and contributed a paper, "Early Research and Present-Day Problems in Hog Cholera Immunization," which was published in the November issue of the JOURNAL. Dr. Hell helped to organize the Eastern Iowa Veterinary Association. He was its first president and served for three terms. He took an active part in the Iowa Veterinary Medical Association and was a past president of that organization. He was a member of Fraternal Lodge, Masons; Kaaba Temple and Zarephath Consistory, of Davenport. Dr. Hell was active in Republican party politics and had been a member of the party senatorial committee in Muscatine and Louisa counties.

Surviving Dr. Hell are his widow (née Minnie Elmergreen), one son and two brothers. His funeral was attended by a large number of veterinarians from Eastern Iowa. The following were honorary pallbearers: Dr. J. H. Spence, of Clinton; Drs. Grant B. Munger, J. W. Griffith and R. T. White, of Cedar Rapids, and Drs. F. J. Crow and J. S. Potter, of Iowa City, five of whom were past presidents of the Eastern Iowa Veterinary Association. F. E. R.

PERSONALS

MARRIAGES

Dr. John J. Solt (O. S. U. '36), of Upper Sandusky, Ohio, to Miss Mary Jane Willis, of Kenton, Ohio, at Covington, Ky., November 9, 1937.

Dr. John W. Van Deven (O. S. U. '37), of Orrville, Ohio, to Miss Frances Read, of Harrisburg, Pa., at Harrisburg, November 25, 1937.

Dr. A. F. Ranney (Corn. '32), of Montpelier, Vt., to Miss Caroline Schleich, of Albany, N. Y., September 11, 1937.

BIRTHS

To Capt. and Mrs. R. A. Boyce, Jr., of Washington, D. C., a son, Robert Arthur Boyce, III, December 9, 1937.

To Dr. and Mrs. C. H. Pals, of Fort Dodge, Iowa, a daughter, Helen Ruth, December 25, 1937.

PERSONALS

Dr. Harry Koll (Chi. '07), of El Paso, Texas, is spending part of the winter in San Antonio.

Dr. C. J. Sall (K. C. V. C. '18) reports a change of address from Bertrand to Holdrege, Neb.

Dr. Mark E. Gale (K. S. C. '36), late of Phoenix, Ariz., is now located at 713 Bishop, Salina, Kan.

Dr. Wm. M. Weldishofer (O. S. U. '17), of Toledo, Ohio, has moved to a farm west of Sylvania, Ohio.

Dr. John B. Jaffray (Chi. '03), of Chicago, Ill., is recuperating from a serious illness due to pneumonia.

Dr. E. B. Orme (Colo. '35) reports a change of address from Norwood, Colo., to Montrose, same state.

Dr. John J. Law (Gr. Rap. '06) has located at Carson City, Mich., where he is engaged in general practice.

Dr. Arthur J. Knilans (Chi. '16), of Janesville, Wis., is building a small hospital to accommodate 30 canine patients.

Dr. E. W. Babson (Harv. '97), of Gloucester, Mass., was elected mayor of his city at the recent municipal election.

Dr. John Micuda (O. S. U. '34) has moved from Rockville to Gaithersburg, Md., where he is now in active practice.

Dr. G. W. Leahy (McK. '15), of Decatur, Ill., has been reappointed Macon County Veterinarian by the Board of Supervisors.

Dr. John S. Koen (K. C. V. C. '07), of Chicago, Ill., spent the holidays on a southern trip that took him as far as Mexico City.

DR. F. A. BONNSTETTER (Iowa '24), formerly of Wesley, Iowa, is now with the U. S. Bureau of Animal Industry, stationed at Fort Worth, Texas.

DR. W. H. LINDLEY (K. S. C. '33), who was located at Leland, Miss., for a time, has returned to Lawrenceburg, Ind., to engage in general practice.

DR. J. J. VARA (Corn. '14), of Bonifay, Fla., has been appointed a member of the Florida Board of Veterinary Examiners for a term of five years.

DR. J. L. DAVIDSON (O. S. U. '33), of Kalamazoo, Mich., addressed the local Lions Club on November 16. His talk was on dogs, their care and habits.

DR. JACOB P. MAUNEY (O. S. U. '35), formerly of the City Health Department, Charlotte, N. C., is now with the Biltmore Dairy Farms, Biltmore, N. C.

DR. D. A. EASTMAN (Iowa '22), of Moline, Ill., addressed the Rotary Club of Galesburg, Ill., on December 10, on "The Activities of the Veterinary Profession."

DR. GEORGE BERGER (O. S. U. '35) is now located at Onancock, Va., in the service of the U. S. Bureau of Animal Industry, engaged in Bang's disease eradication work.

DR. M. J. DONAHUE (Corn. '35), who has been with the Humane Society of Baltimore County, Pikesville, Md., has entered practice at 71 Johnston Street, Newburgh, N. Y.

DR. N. S. HOWE, JR. (Mich. '35) has resigned his position in the U. S. Bureau of Animal Industry and has located at Saint Johns, Mich., where he will engage in general practice.

DR. C. C. ELLIS (Corn. '31), formerly instructor at the New York State Veterinary College, Cornell University, is now Director of the Poultry Diagnostic Laboratory, Montpelier, Vt.

DR. EMMETT W. CANTRALL (Wash. '36) has resigned from the U. S. Bureau of Animal Industry and has taken over the practice of Dr. E. F. Chastain (Wash. '35), at Grants Pass, Ore.

DR. FRED W. MILLER (O. S. U. '16), who was in the service of the U. S. Bureau of Dairy Industry, in Washington, D. C., for a number of years, is now in private practice at Whitewater, Wis.

DR. EARL F. GRAVES (K. S. C. '27), formerly at the Wisconsin State Fur Farm, Poynette, is now in Denver, Colo., where he is connected with the Rocky Mountain National Fur Breeders' Association.

LT. COL. R. A. KELSER (Geo. Wash. '14), U. S. Army Medical Research Board, Ancon, Canal Zone, was elected a member of the American Academy of Tropical Medicine at the fourth annual meeting held in New Orleans, December 3.

DR. H. L. VAN VOLKENBERG (Corn. '18), who was at the Puerto Rico Agricultural Experiment Station at Mayaquez for ten years, is now at the Texas A. and M. College as head of the recently created Department of Veterinary Parasitology.

DR. F. E. STILES (McK. '09), of Battle Creek, Mich., headed a group of local capitalists who took over the operation of the Verona Live Stock Exchange from the Michigan Live Stock Exchange, a farmers' coöperative, the latter part of November.

DR. GEORGE H. HOPSON (Corn. '28), formerly associated with the Borden Company, of New York, as Division Veterinarian, is now with the Kings County Medical Milk Commission, in charge of the sanitary production of certified milk in the counties of Kings, Queens and Long Island; and also as supervisor of the Kings County Medical Milk Commission laboratory.